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PRE-HISTORIC RACES.



Charles Sullivan, Del. *Baker & Co., Engr.*

SKETCH. — ANCIENT WORKS AT MARIETTA, OHIO.

PRE-HISTORIC RACES

OF THE

UNITED STATES OF AMERICA.

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BY J. W. FOSTER, LL.D.,

AUTHOR OF THE "PHYSICAL GEOGRAPHY OF THE MISSISSIPPI VALLEY," ETC.; JOINT AUTHOR OF FOSTER AND WHITNEY'S REPORT ON THE "GEOLOGY OF THE LAKE SUPERIOR REGION;" LATE PRESIDENT OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE; PRESIDENT OF THE CHICAGO ACADEMY OF SCIENCES; AND MEMBER OF OTHER LEARNED SOCIETIES.

CHICAGO:
S. C. GRIGGS AND COMPANY.
LONDON: TRÜBNER & CO.
1873.

33357

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BRADLEY
THE LAKESIDE PRESS
CHICAGO

PREFACE.

IN early manhood, when for the first time I gazed upon the works of that mysterious people known as the Mound-builders, my mind received a class of impressions which subsequent years have failed to efface. These works are in the vicinity of Newark, Ohio; and although not the most stupendous, are the most elaborate in the whole series. It was a bright summer's morning, and the sunlight, streaming through the openings of the dense canopy of foliage above, fell upon the ground in flickering patches. A slumberous silence filled the air; and I confess that, as I traced out the labyrinthine system of earthworks here displayed, with its great circles and squares, its octagons, gateways, parallel roads, and tumuli, the whole spread over an area of several square miles; and as I speculated upon the purposes of their construction, and on the origin and extinction of the people by whom they were reared, I was profoundly impressed.

Gibbon relates that it was among the ruins of the Roman capital he first conceived the idea of writing the history of the decline and fall of that empire. I

cannot say, "comparing small things with great," that it was amid the sepulchres of a vanished race, I conceived the idea of writing this work; but I can say, that, in after life, I have never passed one of their monuments, however humble, without experiencing feelings akin to my first impressions.

In exploring the physical geography of the Mississippi Valley and the Lake Region, I have had abundant opportunities for examining the most notable of the Mound-builders' works. At various times I have published papers on the Archæology of this Continent, among which I may enumerate the following:

A Chapter on ancient Copper-mining. (Foster and Whitney's Report on the Geology of the Lake Superior Region. Washington, 1850. Printed for the House of Representatives.)

Description of Samples of Cloth, from the Mounds of Ohio. (Transactions of the American Association for the Advancement of Science, 1852.)

On the Antiquity of Man in North America, and

Descriptions of certain Stone and Copper Implements used by the Mound-builders. (Transactions of the Chicago Academy of Sciences, vol. i, part ii. 1869.)

On recent Discoveries in Ethnology as connected with Geology:—An Address delivered at Troy, New York, as the retiring President of the American Association for the Advancement of Science. (Transactions, etc., for 1870.)

On certain Peculiarities in the Crania of the Mound-

builders. (Transactions of the American Association for the Advancement of Science. 1872.)

On the Pottery of the Mound-builders. (American Naturalist, February Number, 1873.)

I have also written for the magazines of the day, several articles relating to American Archæology which I do not deem of sufficient importance to enumerate in this connection. The substance of these papers has been incorporated in the following pages, without the designation of quotation marks, and the fact that they were published at different intervals, will account for the repetition, in some instances, of the same ideas.

It will thus be apparent that I enter upon this work, not as a mere compiler, but as an original observer. Most of the illustrations have been derived from materials now for the first time brought together. As this volume is intended only as a Compendium of our Antiquities, to be restricted to a given number of pages, I have been compelled for the most part to represent groups by a single illustration, and on a greatly reduced scale, and to discuss many questions relating to our Ethnology in a summary, and in what some may consider a superficial, manner.

The Smithsonian Institution is entitled to much credit for having brought out such admirable works as "The Ancient Monuments of the Mississippi Valley," by Squier and Davis; "The Antiquities of Wisconsin," by I. A. Lapham; and "The Archæology of the United States," by S. F. Haven; to say nothing of the brief

papers on local antiquities which have appeared in the Annual Reports. It has also caused to be translated and published many valuable papers by foreign authors, which have been essential aids to the American Ethnologist in keeping him advised as to the progress of scientific opinion abroad, and affording him the means of comparison in his individual researches.

It is to be hoped that the honored Secretary of this Institution, Professor Henry, will bring out an illustrated catalogue of American Antiquities, not restricted to the Smithsonian Collections, but embracing those of individuals throughout the United States.

Before closing this preface, I desire to express my thanks to many private individuals and Scientific Associations for having given me access to their Archæological Collections, and in many instances for having furnished me with explanatory notes. These courtesies I have endeavored to acknowledge in the body of the work. So great, indeed, has been the profusion of materials placed at my disposal by the kindness of friends, that I soon found, after entering seriously upon this work, that to properly figure and describe them, would defeat the object in view, by making a volume too costly and too cumbersome for popular reading.

If the public manifest sufficient interest in questions relating to our Pre-historic Archæology to justify the expense, I may hereafter, if life and health are spared, draw more liberally from the materials at my command.

CHICAGO, *May* 1, 1873.

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CHAPTER I.

THE ANTIQUITY OF MAN — EVIDENCES IN EUROPE.

THE combined investigations of geologists and ethnologists, prosecuted during the last quarter of a century, have thrown much light upon the origin of the human race, and developed facts which require us to essentially modify our pre-existing views as to the length of time during which it has occupied our planet. That man lived at a time far too remote to be embraced in our received system of chronology, surrounded by great quadrupeds which have ceased to exist, and under a climate very different from what now prevails, has been so clearly demonstrated that the fact must now be accepted as a scientific truth.

Revelations so startling, have been received with disquietude and distrust by those who adhere to the chronology of Usher and Petavius, which would bring the various migrations of men, the confusion of tongues, the peopling of continents, the development of types, and everything relating to human history, within the short compass of little more than four thousand years.

Those great physical revolutions in the face of Europe, such as the contraction of the glaciers within narrow limits, the gradual change of the Baltic from salt to brackish water, the submergence and subsequent elevation of a larger portion of Southern Russia and

Northern Germany, the conversion of a portion of the bed of the Mediterranean Sea into the desert of Sahara, the severance of France from England, Europe from Africa, and Asia from Europe, by the straits of Dover, Gibraltar, and the Dardanelles, and the dying out of the volcanic fires of Auvergne — all these great physical changes which geologists, by universal consent, admitted were infinitely older than any authentic history or tradition, must now be comprehended in the Human Epoch.

"Ethnology," remarks Sir John Lubbock, "in fact, is passing through a phase from which other sciences have safely emerged, and the new views in reference to the Antiquity of Man, though still looked upon with distrust and apprehension, will, I doubt not, in a few years, be regarded with as little disquietude as are now those discoveries in astronomy and geology, which at one time excited even greater opposition."*

A brief glance at the progress of scientific inquiry will show how vastly our views of the grandeur of the universe have been enlarged by casting aside the dogmas of former ages. The battle-field on which Science and Popular Belief were the contending hosts, has been repeatedly fought over, in which the former has always come off victorious; not as against Christianity, but against the narrow and bigoted views of the times. In the fourth century, to believe in the Antipodes was deemed heretical. In 1430, Copernicus completed his immortal work on the Revolution of the Heavenly Bodies, and for thirteen years retained it in his possession; and when he put it forth, as a safeguard against oppression, he propounded his theory in the form of an hypothesis. It was permitted to slumber for nearly eighty years, and

* Sir John Lubbock, "Pre-historic Times," preface.

when Galileo revived it in explanation of the phases of Venus, the Italian astronomer was silenced.

Fifty years ago, no popular belief was more fixed than that the work of creation was accomplished in six days, each occupying a period of twenty-four hours. Geologists, in investigating the structure of the earth, saw that, to account for all the mutations which it had undergone, required the lapse of an indefinite period of time, stretching back so far remote as to defy computation. To this requirement, every intelligent investigator at this day assents.

Geologists now find that the Antiquity of Man far antedates the era assigned to his creation by the received system of chronology, and submit the evidences of their belief to an enlightened public sentiment.

Thus, within the present generation, has been opened a sphere of investigation which has enlisted an able body of observers, whose labors have thrown a flood of light upon the questions relating to our common humanity. Ethnography has been raised to the rank of the noblest of sciences. However strange these new views with regard to the origin and history of our race may appear, they can not be disregarded. We must weigh the value of observations, and press them to their legitimate conclusions. The investigator at this day must not be trammeled, in the language of Humboldt, by "an assemblage of dogmas bequeathed from one age to another" — "by a physical philosophy made up of popular errors."

A summary of the facts on which the Antiquity of Man is based will form an appropriate introduction to this work; for if the geologist demands time to account for the formation of the successive deposits in which

the vestiges of the human race are preserved, the ethnologist is equally imperative in his demand for time to enable him to account for the migrations of men, their physical peculiarities as manifested in types, and the diversities in their written and spoken languages, in their civilizations, and in their manners and customs. The historical period of 4,000 years, they claim, is inadequate to explain these diversities.

M. Lartet, whose discoveries in ethnography have placed him in the front rank of observers, divides the period of the Pre-historic Man into two ages, and subdivides the first age into three epochs, and the second into two.

	Epochs.
I. STONE AGE.	1. That of the extinct animals, such as the mammoth and cave-bear.
	2. That of the migrated existing animals (Reindeer Epoch).
	3. That of the domesticated existing animals (Polished stone Epoch).
II. METAL AGE.	1. That of Bronze.
	2. That of Iron.

Sir John Lubbock divides Pre-historic Archæology into four periods.

1. "That of the Drift; when man shared the possession of Europe with the mammoth, the cave-bear, the wooly-haired rhinoceros, and other extinct animals." This he calls the Palæolithic" period.

2. "The later or Polished stone Age; a period characterized by beautiful weapons and instruments made of flint and other kinds of stone, in which, however, we find no trace of the knowledge of any metal, excepting gold, which seems sometimes to have been used for ornaments." This he calls the "Neolithic" period.

3. "The Bronze Age; in which bronze was used for arms and cutting instruments of all kinds."

4. "The Iron Age; in which that metal superseded bronze for arms, axes, knives, etc.; bronze, however, still being in common use for ornaments, and frequently also for the handles of swords and other arms, but never for the blades." *

1. *Man as the contemporary of the extinct animals, such as the mammoth and cave-bear.* — Up to a recent time, it was the belief of geologists that the remains of man were restricted to the most superficial deposits, such as are now accumulating on the face of the earth, and little significance was attached to discoveries which served to unsettle this belief. As early as 1823, M. Boué, an accomplished French geologist, found human bones in the undisturbed Löess, at Lahr, in the valley of the Rhine, which were shown to Cuvier, who, while admitting that they were human, insisted that they came from a modern burial-ground. Thus the dictum of the great comparative anatomist was sufficient to override the careful observations of the painstaking geologist.

In 1828, Christol and Tournal, in investigating the cavern of Bize, in the south of France, observed human bones and teeth and fragments of pottery, intermixed with the bones of mammals now extinct, the whole cemented by stalagmite, and exhibiting the same degree of fossilization; but the scientific world failed to recognize the just value of these observations.

In 1833, Schmerling found in the cave deposits of Liége, human bones and rude implements of stone, commingled with the remains of the elephant, rhinoceros, etc.; and, resisting the full force of the evidence before his eyes, he suggested that the bones of the extinct species might have been washed out of the older alluvium which exists in the vicinity.

* "Pre-historic Times," p. 3.

In 1841, M. Boucher de Perthes, a resident of Abbeville, in the valley of the Somme, France, observed flint implements, evidently the work of man, in the terrace-gravel which was there dug out to repair the roads and fortifications of the city, and after having collected quite a number, in connection with the bones of the elephant, rhinoceros, bear, hyena, stag, ox, horse, and other animals, in 1847 he published the results in a work called "Antiquités Celtiques," but the scientific world had no faith in the discoveries. Dr. Rigolet, however, who lived at Amiens, forty miles further inland, and who had written a memoir on the Fossil Mammalia of the valley, was induced to inspect de Perthes' collection, and on returning home resolved to look for similar implements, and he soon found several to reward his exertions. These discoveries he communicated to the scientific world. Dr. Falconer, an eminent English geologist, having stopped at Abbeville and inspected De Perthes' collection, became satisfied that the implements were the work of man, and accordingly wrote to Messrs. Prestwich and Evans, of England, to go to the valley and examine the deposits. Suffice it to say, that they confirmed the results of M. Boucher de Perthes' observations.

The Valley of the Somme, which has now become to the archæologist classical ground, is about a mile wide between Abbeville and Amiens, and is excavated in the Chalk formation with its accompanying flints. The strata repose nearly horizontally. The bluffs which bound the valley are often two and three hundred feet in height, and these surmounted, the country stretches out into a nearly level plateau, which is covered with a layer of brick earth about five feet thick, and is destitute of fossils. Occasionally patches of sand and clay

with Eocene fossils are observed, and the probability is that this formation once stretched continuously over the chalk, but has been broken up and removed by denudation, and these materials contributed largely to form those beds of gravel in which the flint implements and the mammalian remains are entombed. Descending into the valley, we have, according to Sir Charles Lyell, who has carefully investigated its structure, and whose results I shall state in a condensed form,* the following

SECTION ACROSS THE VALLEY OF THE SOMME.

1. Peat twenty to thirty feet thick, resting on gravel deposited on the chalk. (Newest deposit.)
2. Lower level gravel, forming the first bench, with elephants' bones and flint tools, covered with fluviatile loam, twenty to forty feet thick.
3. Upper level gravel, forming the second bench, with similar fossils, and with overlying loam, in all thirty feet thick.
4. Upland loam, without shells, five or six feet thick, spread over the plateau, as before described.
5. Eocene tertiary strata, resting on the chalk strata in patches.

The peat, as before stated, is the most recent of all these deposits, and occupies the lower parts of the valley all the way from the sea to far above Amiens, including Abbeville, and in places is thirty feet thick. All of the imbedded mammalia, as well as the shells, are the same species as those now inhabiting Europe. At some depth in this formation, near Abbeville, are seen trunks of alders standing erect as they grew, with their roots fixed in the ancient soil. Stems of the hazel, and nuts of the same, and trunks of the oak and walnut abound. Traced to the sea-coast, the peat is seen passing under the sand-dunes and below the water-level.

* "Antiquity of Man," ch. vii, *et seq.*

This would indicate that there had been a submergence of the land; of what was once a continuance of the valley into what is now a part of the British Channel. The workmen who cut this peat, declare that none of the hollows during their lives have ever been refilled, and therefore that peat does not grow; but this is a mistake, the increment in one generation not being appreciable by the ordinary observer. Near the surface of this deposit occur Gallo-Roman remains, and still deeper, Celtic weapons of the Stone Period, but this is no sure test of age, for in a semi-fluid mass, heavy weapons would sink down by their own gravity. In one case, however, M. Boucher de Perthes observed several large dishes of Roman pottery, lying in a horizontal position, the shape of which must have prevented them from sinking through the underlying peat. Allowing about fourteen centuries for the growth of the superincumbent vegetable matter, he calculated that the thickness gained in a hundred years would be no more than three French centimetres, say about three English inches. "This rate of increase," observes Sir Charles, "would demand so many tens of thousands of years for the formation of the entire thickness of thirty feet, that we must hesitate before adopting it as a chronometric scale."

The materials making up the deposit designated No. 2 are almost devoid of stratification, and are probably formed of the mud or sediment thrown down by the waters of the river when they overflowed the ancient alluvial plain of that day. Its upper surface has been deeply furrowed by water, at the time when the earthy matter of No. 1 was superimposed. The mammalia most frequently found in this deposit, as well as No. 3, are the following: *Elephas primigenius*, *Rhinoceros*

tichorhinus, *Equus fossilis*, *Bos primigenius*, *Cervus somonensis*, *C. tarandus priscus*, *Felis spelæa*, *Hyæna spelæa*.

The deposit No. 3 is made up of a succession of beds chiefly of a fresh-water origin, but occasionally a mixture of marine and fluviatile shells is observed. In the lowest beds of gravel and sand in contact with the chalk, flint hatchets, some perfect, others much rolled, have been found. Above this bed occurs a white silicious sand, in which are found the remains of numerous fresh-water shells now common to the region, except *Cyrena fluminalis*, which has disappeared from Europe, but inhabits the Nile and many parts of Asia.

The flint implements found in this connection exhibit rude workmanship. The two prevailing forms are oval and pear-shaped. Their edges are more or less fractured or worn, either by use as instruments before they were buried in the gravel, or by being rolled in the river's bed. Many of them are stained ochreous-yellow, while others have acquired white or brown tints, according to the matrix in which they have been enclosed. The surface in many instances is encrusted with a film of carbonate of lime, while in others they exhibit those ramifying markings known as dendrites, which is a useful test of their antiquity. The most general test, however, is a varnish-like or vitreous gloss, as contrasted with the dull aspect of freshly-fractured flints.

In the British Museum there is a flint implement deposited as far back as 1715, with the statement that it was found "near Grayes Inn Lane," with an *elephant's tooth*, in the presence of Mr. Conyers. Thus it is evident, that the fact that man was the contemporary of the extinct animals, was known a century and a half ago, but it had been passed over by geologists.

In 1842, Mr. Godwin-Austen, in a paper communicated to the Geological Society of London, stated that he had observed the association of human remains with those of extinct animals at Kent's Hole, Devonshire, and inferred that they must have been introduced before the stalagmite floor was formed. Another communication to the same effect, from another observer, Mr. Vivian, was denied publication. This example shows how reluctantly new truths are received, where they conflict with our preconceived ideas.

It was, however, the confirmation of the correctness of de Perthes' discoveries, by such eminent geologists and palæontologists as Lyell, Falconer, and Prestwich, that arrested the attention of observers throughout Europe, and induced them to re-examine the bone-caves and gravel-pits of their respective regions; and the result has been, that the association of human remains with those of extinct animals has been detected in many thousand instances, constituting a mass of evidence which can be no longer gainsayed. So great was the interest excited in England by these discoveries that, under the auspices of the Royal Society of London, Mr. Pengelly, with a supervisory committee of men eminent in science, was deputed to explore the cave of Brixham, near Torquay, who with scrupulous care records the exact position of each fossil bone or flint implement exhumed, and the results which he is developing, must convince the most skeptical, that man existed in that region contemporary with the large mammalia. Among these, are the great fossil elephant (*Elephas primigenius*), the rhinoceros (*R. tichorhinus*), the horse, the bison, the reindeer (*Cervus tarandus*), the stag (*Cervus elaphus* and *C. capreolus*), the great cave-bear (*Ursus spelæus*) and two other species (*U.*

ferox and *U. arctos*), the cave-hyena (*H. spelæa*), and the cave-lion (*Felis spelæa*). The same association has been observed in the gravel-pits of Middlesex, Surrey, Bedfordshire, and Suffolk.

On the continent, the progress of discovery in this branch of palæontology has been quite as rapid, and the results have been still more wonderful. Dupont, under the auspices of the government, has carefully explored the Belgian caves, and Lartet and Christy, and others, have explored those of France. Among those belonging to the oldest epoch, may be enumerated the grottoes of Moulin Quignon, Aurignac, Vallieres, Arcy-sur-Yonne, Moustier (Perigord), and the caves of Fontaine, Madelaine, and Pontil. But these do not exhaust the list. The cave of Gailenreuther, in Franconia, that of Laglio, on Lake Como, and the grotto of Macagnome, in Sicily, have revealed abundant reliquæ of man in connection with the bones of extinct animals. In other parts of the earth, in Syria and Brazil, the same association has been observed.

These caverns may be classified under three heads: 1, Those which have served for human habitations; 2, Those which have served as tombs for the reception of the corpses of the departed; and, 3, Those which have been occupied as lairs by the wild beasts. In the first class, even in the absence of human remains, the former presence of man is indicated by the mammalian bones being cleft lengthwise to extract the marrow. In the second class, the passage is narrow, and the entrance was secured by a flat stone to protect the manes from wild beasts. In the third class, the bones are gnawed and never split lengthwise, thus showing that they were dragged thither by the carnivorous animals. In many of the caves are found two or more

strata, belonging to different epochs and separating two distinct faunæ.

The exploration of the cave of Aurignac, by Lartet, afforded the most interesting results. When first discovered, in 1852, the narrow entrance was found to be barred by a flat stone. This being removed, there were disclosed seventeen human skeletons, which the mayor, in the discharge, as he supposed, of a conscientious duty, had caused to be removed and buried in the church-yard; and so faithfully was this order executed, that when M. Lartet, eight years after, visited the town, no one could point out the spot. He, however, instituted further researches. He removed the rubbish which for ages had been accumulating from the summit of the hill, so as to expose the original surface. Here he found the remains of an ancient hearth, as well as the bones of many different animals. On the floor of the grotto were found, without being broken or gnawed, the bones of the cave-bear, the aurochs, the horse, and the reindeer, all of which animals were eaten by the primeval man, together with implements of flint and bone, and discs made from marine shells. Outside the tomb, the bones had all been fractured to extract the marrow, and they bore traces of the flint knives which were used in detaching the flesh. It was evident, too, that after the human feast, the hyenas resorted there to gather whatever was left in the way of offal, for the bones showed the marks of their fangs, and their excrements were distinguishable in the ashes. The number of species of animals here found is wonderful, comprising not less than nineteen species:

Cave-bear *(Ursus spelæus)*,
Brown bear *(U. arctos?)*,
Badger *(Meles taxus)*,
Polecat *(Putorius vulgaris)*,
Cave-lion *(Felis spelæa)*,
Wild cat *(F. catus)*,

Cave-hyena *(Hyæna spelæa)*,
Wolf *(Canis lupus)*,
Fox *(C. vulpes)*,
Mammoth *(Elephas primigenius)*,
Rhinoceros *(R. tichorhinus)*,
Horse *(Equus caballus)*,
Ass? *(E. asinus)*,
Boar *(Sus scrofa)*,
Stag *(Cervus elaphus)*,
Irish elk *(Megaceros hibernicus)*,
Roebuck *(C. capreolus)*,
Reindeer *(C. tarandus)*,
Aurochs *(Bison europæus)*.

The bones of the carnivorous animals found around the hearth were entire, thus showing that they were rejected both by man and beast.

M. Lartet gives this interpretation to the facts here presented: The burial-place is of the highest antiquity, as shown by the many extinct species of animals here collected. The stone which closed the entrance to the grotto was from time to time rolled away to receive a new occupant, while the friends, as indicated by the depth of the layer of ashes and the quantity of bones, held a funeral feast outside. The uninjured bones within the grotto, as well as the flint implements and shell beads, were offerings consecrated to the dead. It seems strange, in the nineteenth century of the Christian era, to have thus vividly brought before us a burial scene which took place at a time which goes back far beyond all history and even tradition. Compared with this sepulchral vault, the pyramid of Cheops is modern.

The climate of the northern hemisphere just preceding the Drift Period, was far milder than at present. Fossil acorns and fir cones are found in the interior of Banks's Land, far within the Arctic Circle. In Greenland are the remains of large forests encased in ice. At Disco's Island, the northern verge of European settlement, the strata are full of the leaves, branches, and trunks, and even seeds and fruit cones of trees, comprising firs, sequoias, elms, magnolias and laurels,—

a vegetation characteristic of the Miocene Period of Central Europe. Spitzbergen was clothed with a luxuriant forest, and the lignite beds of Iceland yield large arborescent forms, where now the vegetation is dwarfed.

The Drift Period, which was one of long continuance, was ushered in by a marked change in physical influences. In the higher regions we find a predominating growth of mosses and saxifrages, where formerly flourished the sequoia and magnolia. The northern region even as low as the temperate zone, was encased in ice. The rigor of the climate was fatal to human life. Whether at that time man existed in the warmer regions of Asia and Africa, and in the tropics of America, remains to be discovered. But at length there came a change. The climate was mitigated. The casing of ice was dissolved, and the glaciers reluctantly retreated. It was at this time that man made his appearance in Europe as the contemporary of the hairy elephant and rhinoceros, and of the great carnivorous animals. After the lapse of time, whose interval cannot be measured, there ensued another period of refrigeration, but of shorter duration. The glaciers again advanced, a flood succeeded, which covered the low lands and the caves, and forced the cave-dwellers to withdraw to the higher grounds. In Belgium, the water, according to Dupont, rose to the height of four hundred and fifty feet. The calcareous mud and gravelly clay which fill many of the valleys of France and Belgium, and known as Löess, attest the retreat of this flood. The "bone earth" which forms the division, in many of the caves, between two distinct faunæ, is also referred to this inundation. At this era commenced

2. *The Reindeer Epoch, or that of the migrated existing animals.* — While the reindeer existed during the pre-

ceding epoch, yet from the great abundance of his remains in the caves of Dordogne, Aude, and other parts of the south of France, M. Lartet inferred that he re-appeared in greatly augmented numbers. The elephant still survived. There were also the aurochs (*Bison europæus*), the horse (ancestor of the present race), the wild ox (*Bos primigenius*), the musk-ox (*O. moschatus*), the Irish stag (*Megaceros hibernicus*), the elk (*C. alces*), and the roebuck (*C. dama*), together with the goat and chamois, and smaller quadrupeds.

Scanty as are the materials, European ethnologists have not hesitated to generalize upon the condition of the pre-historic man during these two epochs. He was a barbarian, and low in intellectual development; a small brain, a retreating forehead and projecting jaws, with great superciliary ridges, the result, perhaps, of the wariness which he was compelled to exercise. He was short in stature, but robust and broad-shouldered, for the exposures to which he was subjected sifted out the weak and diseased. He was a raw-flesh eater, for in many of the jaws which have been disinterred, the incisors are much worn,—a peculiarity which has been observed in the flesh-eating Esquimaux. This fact ought not to be cited to his disadvantage, for in an Arctic climate, where the heat is so rapidly extracted, the system requires a highly nitrogenous food. Our own countryman Kane, when imprisoned by the ice in Rensselaer Harbor, bears witness that nothing was so grateful to the appetite as raw walrus meat. He was a cannibal, for, in Scotland, Owen found upon the bones of children, the marks of human teeth, and the same fact was brought out at the Copenhagen Congress. The conditions of climate rendered agriculture impracticable, but at the same time the soil sustained

a class of vegetation adapted to the support of the higher orders of quadrupeds; hence he must have been a hunter and fisherman. In his physical development and habits, the result of his conflict with circumstances, he must have approached the Esquimaux more nearly than any other of the existing types. These Arctic Highlanders are thus described by Sherard Osborn.

"Although dwarfed in stature, they are thick-set, strong-limbed, deep-chested, and bass-voiced, and capable of vigorous and prolonged exertion. . . . I cannot discover an instance of their ever having been seen to partake of a single herb, grape or berry, grown on shore. Of vegetables and cereals, they have, of course, no conception, and I know of no other people on the earth's surface, who are thus entirely carnivorous."*

Although the pre-historic man was surrounded by the most formidable animals, and his weapons were of the rudest character, yet it must not be inferred that he declined to encounter them in a personal contest. The bone-caves, where we find their commingled remains, attest this fact. By his watchfulness in noting their habits, and by his sagacity in constructing traps and pitfalls, he would come off victor in nearly every conflict. Again recurring for an illustration to the Arctic Highlander, who has no wood except the fragments of a wreck which a favoring gale may have cast upon the shore, and hence no *kaiyak* in which to traverse the water, no bow and arrows with which to kill the musk-ox or reindeer, with his spear and harpoon, made of bone or pointed with meteoric iron found in the country, or scraps of iron-hoops which reach the coast

* "Exploration of the North Polar Region." Journal Royal Geographical Society, vol. xxiv, p. 287.

upon the casks of wrecked whalers, he slays the seal, the bear, and walrus.

Thus it will be seen that man, supplied with the rudest weapons, by the exercise of cunning, approaches and fearlessly attacks the most formidable animals.

They clothed themselves in the skins of animals captured in the chase, and in this respect, too, they imitated the habits of the Esquimaux. Bodkins and needles for piercing and sewing the hides, and implements for pressing and smoothing the seams, have been found. The reindeer, which evidently must have existed in vast herds, was, to the primeval man of Europe, the most useful of animals. Every portion of the carcass was economized. His flesh furnished food; his skin, clothing; his sinews, thread; the metacarpal bone of the fore-leg, awls and needles; and his antlers were fashioned into harpoons, dirks, arrow and spear-heads.

The primeval man may have had movable tents, constructed of skins and poles, for summer residences, and during the winter may, like the Esquimaux, have burrowed in snow, but the caves and grottoes were largely resorted to for shelter, and also employed as sepulchres for the departed. He did not regard death as an endless sleep, as shown by the implements and ornaments found in these sepulchres. That homage which in all ages, and among all nations, the living pay to the dead; those ceremonies which are observed at the hour of final separation; that care which is exercised to protect the manes from all profane intrusion; and those delicate acts, prompted by love or affection, which, we fondly hope, will soothe the passage of the parting spirit to the Happy Land—all these observances our rude ancestors maintained. These facts show that, deep as man may sink in barbarism, brutal as he may be in his instincts,

there is still a redeeming spirit which prompts to higher aspirations, and that to him, even, there is no belief so dreary as that of utter annihilation.

The men of the Reindeer Epoch made considerable advances in the arts over those of the preceding epoch. Their hatchets are more symmetrically wrought; their saws are dexterously notched; their needles of bone and ivory have eyes drilled with consummate skill, but there is found no metallic instrument, and there is no evidence of an attempt to grind and polish their stone implements.

It is only within a limited area in the south of France, that the succession of the Reindeer Epoch is clearly made out. From the caves and grottoes have been recovered many implements which show that, while the fabricators fitted them for useful purposes, they at the same time bestowed upon them a degree of ornamentation, such as the representation of animals in motion, which is artistically far above caricature, or a school-boy attempt at delineation. The substances employed are sometimes slate, at others plates of ivory from the tusks of the fossil elephant, but most generally, the antlers of the reindeer. There are staffs pierced at the base with one or more holes, which M. Lartet regards as batons, or insignia of office. There are lance-points elaborately sculptured. A large plate of ivory, found at Madelaine, in Dordogne, contains an engraving, after the manner of etching, of the fossil elephant with his characteristic markings; the small oblique eye, the ponderous trunk, the recurved tusks, the shaggy mane, and the tufted tail. The design clearly shows that the existing species were not in the mind of the artist, and how could he have become aware of these peculiarities in the now extinct species, except that he was then living?

On an official baton of reindeer's horn, obtained from Laugerie-Basse, in the same Department, there is an elephant's head, with swelling forehead, large ears, and a small eye, while the trunk extends along the base of the baton. Another reindeer horn, found under the shelter of a rock at Bruniquel, has carved upon it an entire mammoth. The legs are straight, massive, without sensible joints, and terminated by large flat feet. From the front extends the haft of a poinard; and if the stump were removed, it will be seen that the animal has his head lowered, and the trunk extends down between the forelegs.

We have, also, an unfinished carving of a reindeer on a poniard handle; a sketchy representation, upon a flat surface of slate, of an amorous combat between two male reindeer, which is witnessed with apparent indifference by the female; a spotted fawn accompanied by its dam, carved on a baton; a cave-tiger, perfectly rendered, on a similar implement; the cave-bear, traced with rude lines on a pebble; and also, the stag, aurochs, horse, wild goat, and, what may perhaps be regarded with the highest interest, man. In one instance, on the fragment of an official staff, is engraved a small human figure. The head is indicated by a circular line. The haunches and thighs are lean, while the abdomen is prominent, as among the Australians. The figure is placed between two horses' heads, and behind is dangling an eel or serpent. There is, also, a statuette in ivory of a female figure, which the Marquis de Vibraye, to whom we owe this discovery, regards as an obscene idol. Birds such as the goose, fishes like the barbel, reptiles like the tadpole, and even flowers, but sparingly as compared with the animals, are represented.

In reference to this collection of pre-historic relics, M. Mortillet remarks:

"The contemporaneity of man and the various extinct animals, and with the indigenous reindeer in France, is broadly, firmly, incontestably proven by the discovery of these products of human industry and skill, so abundantly mingled with the exuviæ of these extinct or emigrated animals in the undisturbed Quaternary beds, and in the midst of cave deposits which have never been manipulated. Man is not only perfectly represented, but the reindeer, an animal now emigrated to the north, the great cave-bear, the cave-tiger, the mammoth, which are extinct, and habitually the carvings are executed on the spoils of the reindeer and mammoth themselves. Beyond all question, man was the contemporary of those animals, parts of which he used for his sustenance, and which he has represented so truly by his art. No more convincing demonstration could be desired or expected."

3. *Epoch of the domesticated existing animals* (Polished stone Age).—In this phase of human progress, we are to contemplate man as the contemporary of the existing flora and fauna, but under modified conditions of soil and climate. Between the Reindeer Epoch and that of the Polished stone, during which the reindeer, the musk-ox and the great stag (*Cervus alces*)—the American moose—migrated to the circumpolar regions, a considerable lapse of time is supposed to have intervened. At all events, there is a broadly-marked change in climatic conditions—one of those physical events in the world's history from which the geologist can assume new lines of latitude and departure.

Thus man survived a revolution which was fatal to the great pachyderms and ferocious beasts of prey, and which forced the hyperborean animals to seek a more congenial climate.

Danish antiquities. — Denmark, though for the most part low and level, much of the surface having been wrested, as in Holland, from the sea by immense mounds or dykes, yet possesses a high degree of interest to the geologist and archæologist. The whole region, at one time, appears to have been studded with tumuli and other structures — the monuments of pre-historic races.*

The shell-mounds, known as "kjökkènmöddings," and which, long ago, were supposed to be raised beaches, are not less replete with human relics. These mounds are from three to ten feet in height, and from one hundred to a thousand feet in length, and are composed of shells of the oyster, cockle, and other mollusks, intermingled with instruments of bone, horn, flint, etc., thus showing that these accumulations were made by man. Whilst these shells are of full growth, as compared with those living in the most favored localities, yet the relative mingling of fresh and salt water has so far changed, that their descendants are now excluded from certain parts of the coast, whilst in other parts they show a stunted growth. In these refuse-heaps, no metallic implements have been detected, and the bones of animals belong to species still living in Europe, and common to the region, except where their extirpation, as

* "It is estimated," says Sir John Lubbock, "that not a day passes without witnessing the destruction of one or more of these tumuli, and the loss of perhaps some irrecoverable link in the history of the human race. Many of the burrows, indeed, contain in themselves a small collection of antiquities, and the whole country even may be considered as a museum on a great scale. The peat bogs, which occupy so large an area, may almost be said to swarm with antiquities; and Professor Steenstrup estimates that, on an average, every column of peat three feet square, contains some specimen of ancient workmanship." — ("Pre-historic Times," pp. 223 and 224.)

in the case of the beaver, can be traced to the direct agency of man. The bones of the emigrated animals, such as the reindeer and musk-ox, are wanting, but in those of the dog, we meet for the first time, with evidences of the domesticated animals.

From these relics we can gather certain definite ideas as to the manners and customs of man at that day. The food which he drew from the ocean consisted of shell-fish, such as the oyster, the cockle, the mussel, and periwinkle; and of the vertebrated fishes, such as the herring, the dorse, the dab, and the eel. Of the feathered tribe, he captured almost exclusively the aquatic birds, such as the swan, the goose, and several species of the duck, and, also, the great auk, now supposed to be extinct, although living within the memory of man. Of land animals, the stag, the roedeer, and the wild boar, were the great sources of food, constituting ninety-seven per cent. of the bones; while those of the urus, dog, fox, wolf, marten, beaver, wild-cat, hedgehog, lynx, and bear are occasionally met with. This list is instructive, for we find that the dog, at this period, first became the companion of man; a companionship which has since been maintained by man in all his migrations the world over. There is no evidence of the existence of the other domestic animals, such as the horse, the ox, sheep, or hog.

The skulls which have been recovered would indicate that the people resembled the Lapps, and it would appear that their front teeth did not overlap as ours do, but met together like a vise—a peculiarity observed at this day in the Esquimaux. In the shell-heaps, the stone implements are almost exclusively of flint, rudely flaked into knives, lance-heads, hammers, etc.; but there is no attempt at polishing. In the large tumuli,

the stone implements are dexterously worked. From this difference in the relics, Professor Worsaac has proposed to divide the Stone Age into an older and later epoch, but Professor Steenstrup considers that the two classes of implements represent two different phases of one single condition of civilization; the tumuli being the burial places of chiefs, and the shell-heaps the refuse of fishermen.

The climate, at this period, must have become less rigorous than during the Reindeer Epoch, and the soil was undoubtedly adapted to agriculture, yet we meet with no remains of the cerealia, with no implements which would suggest an application for cultivating the ground.

The magnificent collection of bronze implements in the museum of Copenhagen, by their beauty of form and curious workmanship, show an immense stride on the part of the pre-historic Danes in a knowledge of the practical arts; and to have attained to this perfection, implies a lapse of time to be measured only by thousands of years. To smelt copper and alloy it with a nearly fixed percentage of tin to form bronze, shows a considerable knowledge of metallurgy. To obtain the requisite heat requires something in the nature of a furnace, supplied with pipes for maintaining a constant blast. Successful in reducing copper, it would be but natural for these ancient smelters to experiment on the more refractory ores, and hence it has been inferred, perhaps too rashly, that the Iron Age rapidly succeeded to that of Bronze.

In the lower beds of peat, flint implements have been taken out beneath the embedded trunks of the Scotch fir (*Pinus sylvestris*), a tree which has not been indigenous to the region within the Historic Period, and

which, when introduced, grows with a sickly growth — thus showing that the climate has undergone marked changes since these flint implements were deposited. To the fir succeeded the oak, now nearly extinct, associated with bronze implements; while implements of iron are associated with the beech.

Denmark, when first known to the Roman, was covered with magnificent forests of beech, and to this day it is the predominating tree; and yet among the recovered bones of the feathered tribe, from the peat bogs, are those of the capercailzie (*Tetrao urogallus*), which feeds principally upon the buds of the pine, which has ceased to exist.

The geological succession of events, as disclosed by the Danish discoveries, would appear to be after the following order: The Reindeer Epoch had closed, and the animals fitted for an Arctic climate, which formerly roamed over France, and almost to the shores of the Mediterranean, had retired to the far north, before the earthen tumuli and shell-heaps, and other relics of human occupancy had been erected; and were succeeded by a fauna now indigenous to the region. On the land, changes in the character of the arborescent vegetation were going on. The pine — associated with the oldest stone implements, and on whose buds the capercailzie fed, gave place to the oak — associated with bronze implements, which in turn gave place to the beech — associated with iron implements, the predominant type of vegetation at this time. Thus, this succession in climatic changes corresponded very closely with the archæological changes of the ages of Stone, Bronze and Iron, bringing down the record to the Historical Period.

In the inland seas, the changes were no less marked.

The waters of the Baltic had become so far brackish that certain marine univalves and bivalves, which attained their full size in the Pre-historic Period, have now ceased to live in their ancient habitats, or have become dwarfed in their dimensions. The inference, therefore, is, that at the time of the Stone Age, the ocean poured a great volume of salt water into the Baltic, through channels from which it is now excluded.*

Lacustrine habitations of Switzerland.—"It had long been known to the inhabitants upon the shores of the Swiss lakes," says M. Desor, "that there existed in many of them ancient posts or piles, which, without reaching the surface, rose to the height of from one to two feet above the bottom. On Lake Neuchâtel, they were especially known to the fishermen, who dreaded them as a cause of injury to their nets. Doubtless also boatmen, in crossing the bay of Auvernier or coasting along the southern shore when the weather was calm, have now and then stopped for a moment above these piles, wondering meanwhile to whom the strange idea could have occurred of driving them at such a depth; and as no inhabitant, not even the oldest fisherman, could tell anything about their origin, the only conclusion arrived at was, that 'all must be very ancient.' More than once, too, from the ooze of the lake, had been drawn at low water, large horns of the deer, and strange utensils whose origin was unknown; among other occasions, at the lake of Zurich, in 1829, and still later, at the lake of Bienne. These things, however, remained a dead letter; the circumstance was thought to be curious, but nothing more. An idea has sufficed to restore life, in some sort, to those ancient remains, and draw from them surprising inferences. A man of

* Lyell's "Antiquity of Man," p. 372.

true science happens to pass in the neighborhood of the works which, during the low stage of water in the winter of 1853–4, were executing at Meilen, on Lake Zurich. To him are shown the half-decomposed posts drawn up from the dark mud, which the lake had temporarily abandoned, and here and there some rude fragments of pottery, evidently very ancient, but not Roman, for it is black, imperfectly baked, and fashioned by hand, without the aid of the potter's wheel. The utensils, the arms, the posts, which accompany them, have a still more primitive aspect; they recall analogous objects collected in the peat mosses of Scandinavia, and must consequently be of a very high antiquity. What had escaped all notice was the relation which these objects bear to one another, and especially to the piles imbedded in the ooze. Yet the arms and pottery are not dispersed at hazard; they are limited to a particular stratum, having a thickness of two feet, which has received the name of 'the archæological stratum.' Moreover, they are accumulated around the piles, where they are found in large quantities, while they diminish and disappear in proportion as you recede from them, thus showing that there is a connection between the pits and the antique objects. It was this connection which M. Ferdinand Keller, guided by his practised eye, was enabled to detect, and which, once caught sight of, has become the torch to conduct us to the discovery of an unknown world. In effect, such an association of arms and implements indicated, beyond a doubt, traces of man. The piles, upright in the midst of these objects, had been placed there by design, evidently to support some construction, but as their foundation is below the mean water-level, they must evidently have been planted in the water. There had existed,

therefore, habitations or storehouses, built intentionally on the water, at the places indicated by the piles. The number of scattered utensils corresponding with the thickness of the bed which contains them, bore witness, in turn, to a prolonged sojourn. Consequently there had been an epoch during which the inhabitants of that country constructed places of refuge on the water, if, indeed, they did not dwell there. It was the period of *Lacustrine Constructions*. . . .

"The hint being first given by the publication of M. Keller, in the Memoirs of the Archæological Society of Zurich, the zeal and activity of our Swiss antiquarians might safely be relied upon to elaborate this new vein, which, indeed, did not long delay to furnish us with scientific treasures. They began by seeking for piles in other Swiss lakes. The fishermen could almost everywhere point them out, and these piles, became in turn, valuable guides in conducting to unexpected discoveries. At Meilen, with the exception of a single object in metal, only utensils of bone and stone had been brought to light. Elsewhere, and more especially in the lakes of Eastern Switzerland, besides stations recalling those of Lake Zurich, were discovered other stations which, instead of objects of silex and bone, yielded numbers of utensils in bronze. These articles bore witness to a much more advanced civilization. The Lacustrian Period, therefore, embraced several distinct phases. It became an interesting problem to investigate and fix, if possible, the peculiar character of these different phases or epochs. . . . Hence, as in the North, three epochs were distinguished: That of Stone, Bronze and Iron." *

It may be remarked that the oldest of these epochs,

* M. Desor, "Palafittes, or Lacustrine Constructions," etc., pp. 3, 5, 6.

as in Scandinavia, does not extend back to the Reindeer Epoch of Southern France.

More than two hundred of these lake habitations have been discovered in Switzerland alone, and appear to be common to the three epochs. The trees selected for the piles during the Stone Age, from three to six inches in diameter, were felled by stone axes, and the end to be driven into the ground was sharpened by burning. The piles are embedded in mud from one to five feet, but where the bottom was hard, stones were brought and filled in, forming what are known as "tenevieres." The upper end of the piles projected probably from four to six feet above the surface of the water, and upon these was laid a platform, serving as the foundation of the hut. It is supposed that as many as three hundred of these huts were grouped together, giving shelter to as many as a thousand people, with a narrow causeway connecting with the shore. The offal and ashes were allowed to drop into the lake, but it is difficult to explain why so many human relics, useful in their rude arts and the product of much labor, were permitted to share the same destination. These relics, thus embedded in a medium which resisted decay, when dredged at this day from their long resting place, appear fresh and uninjured. The arrow-heads of the Swiss lake-dwellers were made of flint, but sometimes of rock-crystal. In their axes, jade or nephrite was used—a mineral which, strange to say, geologists have not found in place on the continent of Europe. Deer's horn was employed for hammers, war-clubs, and as handles for hatchets. Their pottery, of which no entire vessels have been found, was rude and coarse. They probably clothed themselves to a great extent in skins, yet fragments of cloth, regularly spun and woven, and

of a flax fibre, have been found. This is the first instance we have of weaving, unless it be in the case of the Mound-builders of this country.

The remains of contemporary animals, which have been ably investigated by Professor Rütimeyer, possess the highest interest. All the wild animals still survive, except the wild bull (*Bos primigenius*), whose descendants, it is conjectured, are to be found in our larger cattle. Among the domesticated animals were the dog, and, for the first time noticed, the pig, horse, goat, sheep, and at least two kinds of oxen. I need hardly pause to describe how essentially these domestic animals contribute to the support and comfort of man; some in supplying him with food and raiment, and some in lightening his daily toil, and in removing heavy obstacles with ease and expedition, which would require the combined labor of many men, and would occupy a very considerable time. The horse, perhaps, was the most useful ally of all.

Here, too, we meet with the first evidences of the use of cereals as an article of human food. Three varieties of wheat, two of barley, and two of millet have been found, together with peas; but rye and oats were unknown. The cultivated plants, according to Heer, differ from the existing varieties, and invariably have smaller seeds or fruits. Carbonized apples have also been met with, cut in two or more parts, as though dried and put aside for winter's use. The seeds of the raspberry, blackberry, strawberry, the shells of the hazel-nut and beech-nut, and the stones of the wild plum, have been recovered. This, then, was the era of domesticated animals and plants—an important stride in human progress. Heer has further shown that these civilized plants are not of Asiatic, but of African, and to a great extent, of Egyptian origin.

The Bronze Epoch was signalized by an advance still more important. The art of hardening copper furnished man with a class of weapons far more efficient in felling the forests and turning up the soil, than he had hitherto possessed. Few of us realize how formidable a barrier a luxuriant forest interposes to a people possessed only of rude implements, in all that relates to an interchange of commodities and agricultural development. At this day, an Amazonian forest, by its very rankness of vegetation, resists all attempts of man, with his vastly-improved implements, to subdue it.

While copper is not sparingly distributed throughout Europe, tin is restricted to two or three known localities, and the fact that widely-separated peoples, like those of Ireland, England, Denmark, Switzerland, Italy, etc., were able to supply themselves with this rare and essential metal, implies that there must have existed at that early period, a maritime nation with whom they cultivated close commercial relations. The implements manufactured from this compound consist of axes, swords (invariably leaf-shaped, as though used for thrusting), javelins, daggers, and knives, together with personal ornaments, such as bracelets, torques, brooches, and hair-pins.

The Iron Epoch comes down so near to the Historic Period, that it may be dismissed with a single remark. It is, emphatically, to a knowledge of the art of reducing and tempering iron that man is so largely indebted for the mastery which he has been able to acquire over the forces of nature. This art has enabled him to replace his rude implements with others far more efficient, and consequently to add greatly to his comforts. To iron we owe the steam-engine, the railway, the steamship, the magnet, the telegraph, and a thousand combinations

of labor-saving machinery, and each year new applications are devised and brought into use. Possessed of these tremendous resources, there is no danger that the enlightened nations will ever relapse into barbarism.

With regard to the relative age of the palafittes, M. Desor remarks:

"It is beyond doubt that the duration of each of the periods which we have been reviewing, was very long. They bear each their peculiar stamp, which can be impressed only by time, among populations which have a fixed residence, and whose prolonged sojourn in the different stations of our lake (Neuchâtel) is attested by a considerable accumulation of ruins. It is equally certain that the lacustrine constructions ascend to a very remote epoch, since there exists no tradition, no legend, which makes any allusion to them, since ancient chronicles are wholly silent with regard to them, and none of the authors of antiquity, who have spoken of Helvetia, make any mention of them."*

M. Morlot, taking advantage of a section, made in constructing a railway across the delta of the Tinière, an affluent of Lake Geneva, which is in the form of a flattened cone, and whose structure implies that it has been formed very gradually and by the uniform action of the same causes, has undertaken to compute the duration of these several epochs, each of which is represented by an ancient stratum. By comparing the depths of these different strata and estimating the rate of their deposition, he has been led to assign to the Bronze Epoch a date of between 3000 and 4000 years, and to the Stone Epoch a date of from 5000 to 7000 years.

M. Gilleiron, from a study of the lake of Bienne, by adopting the known rate of the gain of the land in seven

* "Lacustrine Constructions," p. 52.

and one-half centuries, has arrived at a result nearly analogous with regard to the date of the Stone Epoch —sixty-seven and one-half centuries.

Lacustrine constructions exist in Austria, Bavaria, and Italy. Pliny had his country seat in their vicinage, upon the banks of Lake Como. "If this celebrated writer," remarks M. Desor, "had not a single word to bequeath to us upon lacustrine habitations, we feel authorized to conclude that these constructions existed no longer at that date (A. D. 79), but that they had even perished from the memory of men." The Phœnicians and Etruscans were acquainted with the use of iron, and, therefore, if they were the importers of the tin which enters into the composition of the bronze instruments of Scandinavia and Switzerland, it is difficult to account for the entire absence of iron implements in those countries during the Bronze Epoch. We must look then, says M. Desor, beyond both the Etruscans and Phœnicians, in attempting to identify the commerce of the Bronze Epoch with our palafittes.

Pre-historic remains in the Nile Valley.— Another class of researches which throws light upon the high antiquity of man may properly be adverted to. Between 1851 and 1854, Mr. Leonard Horner, under the joint auspices of the Royal Society of London and the Egyptian Government, carried two series of shafts and borings across the Nile Valley, between Heliopolis and Memphis. Jars, pots, and vases, and in one instance a copper knife, were brought up within the first sixteen feet, which consisted of excavation, when, in consequence of water, the auger was substituted and carried to the depth, in some instances, of seventy-two feet. Almost everywhere, and at all depths, fragments of burnt brick were brought up; nor did the workmen

penetrate to the bottom of the alluvial sediment. All the bones met with belonged to living species, such as the ox, dog, ass, and dromedary, and all the shells were of fresh-water origin and common to the region.

Mr. Horner instituted experiments with a view of obtaining an accurate scale for determining the age of a given amount of Nile sediment. M. Rosière, who accompanied the expedition of Napoleon to that country, had estimated that the Nile mud accumulated at the rate of five inches in a century. Mr. Horner did not deem it proper to adopt this as a chronometric scale, but preferred to examine the accumulation which had taken place around monuments of a known age, and for this purpose selected the obelisk of Heliopolis, which is believed to have been erected 2300 years B. C., and adding 1850, there had elapsed 4150 years, in which eleven feet of sediment had been deposited, which is at the rate of 3.18 inches a century. "Entire reliance cannot be placed on this conclusion," says Mr. Horner, "principally because it is possible that the site originally chosen for the temple and city of Heliopolis was a portion of land somewhat raised above the level of the rest of the desert." * In the case of the colossal statue of Memphis, the surface is 10 feet 6¾ inches above the base of the platform. Assuming that this platform was sunk 14¾ inches below the surface of the ground, at the time it was laid, the accumulation would be 9½ feet. Rameses is supposed to have reigned between 1394 and 1328 B. C., which would give an antiquity of 3215 years, and consequently a mean increase of 3½ inches of sediment in a century.

If we take 2½ inches as the scale, a work of art 72 feet deep must have been buried more than 30,000

* "Philosophical Transactions," 1858, p. 73.

years ago. The pottery found by Mr. Horner, at the depth of 39 feet, according to his scale, must have been buried 13,000 years.

Experienced Egyptologists do not regard his data as sufficient; but the fact is unquestioned that deep down in the Nile mud, beneath the foundations of monuments whose origin reaches back to the dawn of the Historic Period, are found the relics of a still older people, who flourished at a time when the conditions of soil and climate were apparently the same as at this day; and yet these people were modern as compared to those who were the contemporaries of the great Siberian elephant and rhinoceros.

Here, in the Nile valley, are the ruins of mighty cities which we have been accustomed to regard as among the oldest monuments of man's work. Here stand the Pyramids, upon which Moses and his fellow captives are supposed by some to have toiled, when in Egyptian bondage. The deserted temples, the prostrate obelisks, and other mouldering structures are inscribed with characters which have challenged the antiquarian's skill to interpret. In our reckless curiosity we have invaded the chambers of the dead, and dragged forth to light, forms, embalmed with rich spices and ointments, which were once instinct with life, and whose minds were agitated by the same passions and swayed by the same motives that control us; and yet the tread of these men was above the dust of generations whose name and nation, even then, had perished from the earth.

NOTE. — It has been argued from palæontological analogies, that we may expect to find the relics of man in the Miocene Tertiary, and there are some obscure facts which sustain such an opinion.

M. Desonyers, in the Comptes Rendus for June 1863, has described certain markings on some bones obtained by him from the Upper Pliocene

beds of St. Prest, which are analogous to those produced by flint knives and several of the deer skulls were broken in the same way, as if by a blow at the base of the horns. M. l'Abbé Bourgeois, at the same place, has discovered worked flints; but the true position of the bed in which these relics were found has not been satisfactorily determined. Professor G. Ramorino, of Italy, at a meeting of the Society of Natural History, in 1867, exhibited some bones from the Pliocene, which showed the marks of knives. M. Bourgeois, from the Miocene of Pontlevoy, recovered many flints which showed the marks of fire, and others which showed, in his opinion, evident marks of human workmanship. The marks of fire do not absolutely prove that they were produced by human agency.

M. Tardy has described a flint flake found by him in the Miocene beds of Aurillac (Auvergne).

The ancestors of the European man, probably, originated in the warm regions of Africa or Asia, and it is to researches in those regions, which are comparatively unknown, that the ethnologist now looks with the keenest interest.

There are two admirable English works relating to the subject of the foregoing chapter,—Sir Charles Lyell's "Antiquity of Man" and Sir John Lubbock's "Pre-historic Times," which should be read by those desirous of fully investigating the evidence upon this subject.

CHAPTER II.

THE ANTIQUITY OF MAN — EVIDENCES IN THE UNITED STATES.

I HAVE given, in the preceding chapter, a brief summary of the European evidences of the antiquity of our race, as collected and collated by men of the highest scientific attainments. A deep feeling of distrust pervades the public mind of this country, in reference to every discovery which is supposed to carry back the origin of man to a period antecedent to the Historical Era; and yet, reasoning from palæontological analogies, we ought to expect to find evidences of the human occupancy of this continent, reaching back to an antiquity as remote as on the European continent. Nor are such evidences wanting, although less abundant and less conclusive; but when our superficial deposits shall have been as thoroughly investigated as those of Europe, we may expect to find proofs of the existence of the elder man equally authentic. The results hitherto obtained are of a nature to stimulate us to renewed exertions, and to encourage the hope that this country will afford the materials to aid in the interpretation of one of the most interesting pages in the history of the past.

Evidences of man's works in the gold-drift of California.— In 1857, Dr. C. F. Winslow sent to the Boston

Natural History Society, the fragment of a human cranium found in the "pay-dirt," in connection with the bones of the mastodon and elephant, one hundred and eighty feet below the surface of Table Mountain, California. Dr. Winslow has described to me all the particulars in reference to this "find," and there is no doubt in his mind, that the remains of man and the great quadrupeds were deposited contemporaneously.

Another discovery of a human cranium, in this State, deep down in the gold-drift, and covered with five successive overflows of lava, was looked upon with incredulity by what might be called the intelligent portion of the community, and the reputed finder was accused of an attempt to perpetrate a scientific fraud; but Professor Whitney, who succeeded in securing this relic for the museum of the State Geological Survey, after a careful examination of the locality where it was said to be found, and after having questioned the persons who had had it in their possession, arrived at the conclusion that the find was authentic.

This skull was found in a shaft one hundred and fifty feet deep, two miles from Angelos, in Calaveras County. The shaft passed through five beds of lava and volcanic tufa, and four beds of auriferous gravel. The upper bed of tufa was homogeneous, and without a crack through which a human relic could have been introduced into the lower beds. The skull was given to Professor Wyman to describe, who found great difficulty in removing the cemented gravel with which it was incrusted. It was subsequently submitted to the American Association for the Advancement of Science, at the Chicago meeting, in 1869, and Professor Whitney communicated a statement of the conditions under which it was found, but no report of his remarks was

made. Portions of the cemented gravel yet adhered to the relic. This skull, admitting its authenticity, carries back the advent of man to the Pliocene Epoch, and is therefore older than the stone implements of the drift-gravel of Abbeville and Amiens, or the relics furnished by the cave-dirt of Belgium and France.

With regard to the gold-drift of California, according to Mr. Whitney, there is nothing to indicate the former existence of the Great Northern Current, whose course on the eastern part of the continent is so conspicuously marked by the grooving and polishing of the rocks, and the deposit of long trains of erratic blocks; and the absence of these phenomena is observed along the whole Pacific Coast of the United States, and the eastern flanks of the Rocky Mountains. But there is evidence that the Sierra Nevada was once occupied by glaciers which, in their descent, ground up and dispersed the gold-bearing quartz, and entombed the remains of the fossil elephant and other contemporary animals. The age of these gravels in referred by Professor Whitney to the Pliocene, or the age before the volcanic eruptions which cover a greater part of the State, took place. Since the introduction, then, of man, the physical features, as well as the climate of this region, have undergone great changes. The volcanic peaks of the Sierra have been lifted up, the glaciers have disappeared, the great cañons themselves have been excavated in the solid rock, and what were once the beds of streams now form the Table Mountains.

A few years ago, Mr. J. Stanley Grimes presented to the Chicago Academy of Sciences, on behalf of Mr. John Shipman, of Knightstown, Indiana, an implement from the gravel deposits of California, which is represented in the following figure:

The material is sienite, and the instrument is ground and polished so as to display in marked contrast the pure white of the feldspar and the dark-green or black of the hornblende. It is in the form of a double-cone, one end terminating in a point, while the other end is blunted, where it is pierced with a hole which instead of being a uniform gauge, is rimmed out, the rimming having been started from the opposite sides.

FIG. 2.—½.



Plummet (?) from San Joaquin Valley, Cal.

In examining this beautiful relic, one is led almost instinctively to believe that it was used as a plummet for the purpose of determining the perpendicular to the horizon. So highly-wrought a stone would hardly have been used as a sinker for a fishing-net: it may have been suspended from the neck as a personal ornament. When we consider its symmetry of form, the contrast of colors brought out by the process of grinding and polishing, and the delicate drilling of the hole through a material so liable to fracture, we are free to say it affords an exhibition of the lapidary's skill superior to anything yet furnished by the Stone Age of either continent.

This instrument was discovered by some workmen who were digging a well on the lands of Mr. Lafayette Nealy, in the valley of San Joaquin. It was imbedded in the gravel, thirty feet below the surface, and was taken possession of by M. Nealy, who transferred it to Mr. Shipman.

Professor Whitney, to whom I wrote, suggesting the propriety of examining into the matter, replied, that it

was not necessary to investigate that particular locality; that elephent and mastodon bones were found all over the State, at the surface and at the depth of a hundred feet or more, in the Post-pliocene; and that the occurrence of artificial implements, in this connection was very common; and concluded by saying: "The question to be investigated is, whether the works of man and his bones are older than the Post-pliocene?" He stated, further, that he had two or three similar implements, and that they were generally regarded as sinkers for use in fishing.

Mr. W. P. Blake exhibited at the Paris Exposition, several flint implements which were found in the auriferous gravel of California.

Ancient basket-work from Petit Anse Island, Vermilion Bay, Louisiana.—The first scientific notice of the occurrence of human remains in connection with those of extinct mammalia at this point, was given by Professor Henry, on the verbal statements of T. F. Cleu, Esq., who contributed a specimen of ancient basket-work to the Smithsonian Institution.*

"Petit Anse Island is the locality of the remarkable mine of rock salt, discovered during the late Rebellion, from which, for a considerable time, the Southern States derived a great part of their supply of this article. The salt is almost chemically pure, and apparently inexhaustible in quantity, occurring in every part of the island (which is about 5000 acres in extent), at a depth below the surface of the soil of fifteen or twenty feet.

"The fragment of matting was found near the surface of the salt, and about two feet above it were remains of tusks and bones of a fossil elephant. The

* This specimen was figured by me in the Transactions of the Chicago Academy of Sciences, vol. i. part ii.

peculiar interest in regard to the specimen is in its occurrence, *in situ*, two feet below the elephant remains, and about fourteen feet below the surface of the soil, thus showing the existence of man on the island prior to the deposit in the soil of the fossil elephant. The material consists of the outer bark of the common southern cane (*Arundinaria macrosperma*), and has been preserved for so long a period, both by its silicious character and the strongly saline condition of the soil."

In 1867, this locality was examined by Professor E. W. Hilgard and Dr. E. Fontaine, Secretary of the New Orleans Academy of Sciences. The latter states, that at the depth of twelve feet below the surface and immediately overlying the salt-rock, incredible quantities of pottery were thrown out of the pits by miners, mingled with fragments of the bones of the elephant and other huge extinct quadrupeds. "The animals seem to have been 'bogged,' and perished in the miry clay above the salt. . . . The aborigines used the rock salt, and there seems to have been immense quantities of it required for their various purposes, from the heaps of the fragments of baskets and clay vessels imbedded in the valley," but Dr. Fontaine maintains that none of these remains, human and quadrupedal, can claim a high antiquity, for all the formations of the island are *Quaternary*, belonging to the "Bluff" formation—the remnant of the ancient valley of the great river—and overlying the "Orange" Sand. I may remark that the Orange Sand spread over the Southern country is regarded as the equivalent of the Drift, and the Bluff formation as the equivalent of the Löess; and that if these human remains are really covered by the latter deposit, they are as old as any thoroughly-

accredited relics observed in Europe. The statements of Dr. Fontaine are not clear upon this point. On one page he states that these remains are found in "alluvium washed from the surrounding hills," and on another page he gives a section in which they are represented as surmounted by strata of loam, clay, sand, and pebbles, embracing an aggregate thickness of about 180 feet. Upon the main point he is decided: "that they are so mingled that we can only infer that the men and animals were coeval."*

Professor Hilgard regards the deposit in which these commingled remains are found as a mass of detritus washed down from the surrounding hills. "The pottery," he says, "at some points, forms veritable strata, three and six inches thick;" and he adds in a note that "It is very positively stated that mastodon bones were found, considerably *above* some of the human relics. In a detrital mass, however, this cannot be considered a crucial test."†

Leaving out the question whether or not the Löess covers these commingled remains, it would appear, by the statement of one of these observers, who has written a work to refute the high antiquity of man, that the two classes of remains were coeval; and the other does not gainsay the positive statements of men familiar with the modern workings, that bones of the mastodon were found considerably above some of the human relics. It may be said, however, that in an island, whose area is less than eight square miles, there would be few floods of sufficient power to transport such heavy bones as

* "How the World was Peopled," by Rev. Ed. Fontaine, pp. 67-9.

† "Smithsonian Contributions to Knowledge," No. 248. "On the Geology of Lower Louisiana and the Salt Deposit on Petit Anse Island." By E. W. Hilgard, p. 14.

the tusks and molars of mastodons to any considerable distance.

Human remains in the Löess of the Mississippi Valley. —The immediate channel of the Lower Mississippi, throughout its entire course from Cairo to Natchez, according to Humphreys and Abbot, is excavated in the Cretaceous clays. The terraces which border the valley near the Gulf consist of Eocene tertiary, succeeded by a thin stratum of sand and pebbles, and surmounted by fifty or sixty feet of yellowish comminuted loam, which Sir Charles Lyell was the first to point out as the equivalent of the Rhenish Löess. The Tertiary beds are of marine origin, while those of the Löess are of fresh-water, and contain numerous shells, all of which are of terrestrial origin, now living and common to the region, together with the remains of the great pachyderms, the megalonyx, horse, lion, etc. In the bottom of one of the ravines, cut through this deposit, Dr. Dickeson, of Natchez, many years ago, found the pelvic bone of man, *os innominatum*, mingled with those of extinct animals. The question is, whether both classes of remains had been washed from the same deposit.

Sir Charles Lyell, in 1846, visited that region, carefully studied the structure of the bluff, and inspected the bone in Dr. Dickeson's collection. "It appears," he remarks, "to be quite in the same state of preservation, and even of the same black color as the other fossils, and was believed to have come, like them, from a depth of about thirty feet from the surface.

"In my 'Second Visit to America'* I suggested as a possible explanation of this association of a human bone with remains of a mastodon and megalonyx, that the

* Vol. ii, p. 197.

former may possibly have been derived from the vegetable soil at the top of the cliff; whereas the remains of extinct mammalia were dislodged from a lower position, and both may have fallen into the same heap or talus at the bottom of the ravine. The pelvic bone might, I conceived, have acquired its black color by having lain for so many years or centuries in a dark, superficial, peaty soil, common in that region. . . . No doubt, had the pelvic bone belonged to any recent mammifer, other than man, such a theory would never have been resorted to, but so long as we have only one isolated case, and are without the testimony of a geologist who was present to behold the bone when still engaged in the matrix, and to extract it with his own hands, it is allowable to suspend our judgment as to the high antiquity of the fossil." *

Dr. Joseph Leidy arrives at substantially the same conclusions. "The specimen," says he, "with its reputed associates (bones of the megalonyx and mylodon) is preserved in the museum of the Academy of Natural Sciences of Philadelphia, and all present the same appearance of preservation and color. They are not petrified, but have preserved their original consistence of composition, with little change, other than being stained chocolate-brown, from ferruginous infiltration.

"The human bone consists of about half of an ilium, together with the back part of an ischium to where its tuber begins to turn forward; the ilium is broken at its border, except at the ischiatic notch and about an inch and a half of the crest where this is thickest anteriorly. The bone is mature, and exhibits no trace of ephiphysial separation, as has been stated. Placed in correspondence with an ilium of recent Man, it presents no

* "Antiquity of Man," p. 203.

distinctive character. The specimen may have been contemporary with the remains of extinct animals, with which it is said to have been found, though it appears to me to be equally, if not more probable, that it may have fallen into the formation from an Indian grave above, at a comparatively recent date, and become stained, like the true fossils, from ferruginous infiltration."*

In this connection I would introduce the testimony of a highly competent observer, Professor C. G. Forshey.† He states:

"I examined the spot where the bone was found — in Bernard's Bayou, just above the bridge, on the Pine-ridge road, two and one-half miles from Natchez. The material from which it was taken was a dark loam in the bottom of the thirty-feet bayou. It was probably not *in situ*, but this loam, and the bone too, probably, had caved in from some point above, and had been drifted thither from fields of several miles square, above the road. A dozen plantation burial places, and Indian mounds and camps had been exposed above for centuries; and in recent years, since inhabited by the whites (for a hundred years), the drains had cut through the surface to the depth of twenty and even forty feet in the bluff loam-beds. The probabilities are a hundred to one, that this bone was not of the Bluff (mastodon) formation, but of the recent era.

"The mastodon bones and all others, of which there were many, whelmed in the floods which deposited the bluffs, were all rotten. We had the utmost difficulty in preserving any of them—tusks or bones, and only succeeded when we had varnish or glue at hand to pro-

* 'Extinct Mammalia of North America," p. 365.

† "MS. Notes," communicated to the Author.

tect them. No human bones of any kind were ever found, unless this pelvic bone be an exception."

Arrow-heads in connection with the bones of the mastodon.—The late Dr. Koch, of St. Louis, who disinterred, in the Osage Valley of Missouri, the skeleton of the mastodon which now forms so conspicuous a feature in the palæontological department of the British Museum, stated that, in connection therewith, were found flint arrow-heads and remains of charcoal, as though the aborigines had attacked and destroyed the animal when mired. This statement, at the time, was received by the scientific world with a sneer of contempt. It was my fortune to be thrown in company with Dr. Koch for several days, during the last year of his life, and among other things I questioned him very pointedly as to the possibility of his having been mistaken, when he assured me in the most solemn and emphatic manner, that his statement was true. He was an indefatigable collector, and few men in this country, by individual effort alone, have been more successful in bringing to light so many of the skeletons of the huge animals that roamed over the land or swarmed the seas of past ages. His knowledge in many branches of Natural History was considerable, but not of that exact character to bring out important generalizations. No one who knew him will question but that he was a competent observer, and to deny the accuracy of his statement is to accuse him of having attempted to perpetrate a scientific fraud. It may be said, however, that the scientific opinion of this country regarded his statements in about the same light as the French geologists did those of M. Boucher de Perthes, when he brought out his "Antiquités Celtiques"—that is with absolute distrust: but the one lived to see the truth of his obser-

vations acknowledged and their value appreciated; the other died with a cloud hanging over his reputation.

The following extracts are taken from Dr. Koch's paper communicated to the St. Louis Academy of Sciences:

"In the year 1839, I discovered and disinterred in Gasconade County, Missouri, at a spot in the bottom of the Bourbeuse River, where there was a spring distant about four hundred yards from the bank of the river, the remains of the above-named animals. The bones were sufficiently well preserved to enable me to decide positively that they belonged to the *Mastodon giganteus*. Some remarkable circumstances were connected with the discovery. The greater portion of these bones had been more or less burned by fire. The fire had extended but a few feet beyond the space occupied by the animal before its destruction, and there was more than sufficient evidence on the spot that the fire had not been an accidental one, but on the contrary, that it had been kindled by human agency, and according to all appearance, with the design of killing the huge creature which had been found mired in the mud and in an entirely helpless condition. This was sufficiently proven by the situation in which I found, as well those parts of the bones untouched by the fire, as those which were more or less injured by it, or in part consumed; for I found the fore and hind legs of the animal in a perpendicular position in the clay with the toes attached to the feet, just in the manner in which they were when life departed from the body. I took particular care in uncovering these bones, to ascertain their position beyond any doubt, before I removed any part of them, and it appeared during the whole excavation, fully evident that, at the time when the animal in question found its

untimely end, the ground in which it had been mired, must have been in a plastic condition, being now a greyish-colored clay. All the bones which had not been burned by the fire had kept their original position, standing upright, and apparently quite undisturbed in the clay, whereas those portions which had been extended above the surface had been partially consumed by the fire, and the surface of the clay was covered, as far as the fire had extended, by a layer of wood-ashes, mingled with larger or smaller pieces of charred wood and burnt bones, together with bones belonging to the spine, ribs, and other parts of the body, which had been more or less injured by the fire.

"The fire appeared to have been most destructive around the head of the animal. Some small remains of the head were left unconsumed, but enough to show that they belonged to the mastodon. There were also found, mingled with these ashes and bones, and partly protruding out of them, a large number of broken pieces of rock, which had evidently been carried thither from the shore of the Bourbeuse River, to be hurled at the animal by his destroyers, for the above-mentioned layer of clay was entirely void even of the smallest pebbles; whereas, on going to the river I found the stratum of clay cropping out of the bank and resting on a layer of shelving rocks of the same kind as the fragments, from which place it was evident they had been carried to the scene of action. The layers of ashes, etc., varied in thickness from two to six inches, from which it may be inferred that the fire had been kept up for some length of time. It seemed that the burning of the victim and the hurling of rocks at it, had not satisfied the destroyers, for I found also among the ashes, bones, and rocks, several arrow-heads, a stone spear-head, and some stone

axes, which were taken out in the presence of a number of witnesses, consisting of the people of the neighborhood, attracted by the novelty of the excavation. The layer of ashes, etc., was covered by strata of alluvial deposits, consisting of clay, sand, and soil, from eight to nine feet thick, forming the bottom of the Bourbeuse in general, and on the surface, near the centre of the spot on which the animal had perished, was situated the spring, the water of which was used for domestic purposes; and it was in digging to clear out the spring that the existence of bones there had first been discovered by the owner of the land.

"It was about one year after this excavation that I found at another place, in Benton County, in the bottom of the Pomme-de-Terre River, about ten miles above its junction with the Osage River, several stone arrow-heads, mingled with the bones of a nearly entire skeleton, mentioned above as the *Missourium*. This discovery is already so well known that I will merely mention the circumstance in this connection, that the two arrow-heads found with the bones were in such a position as to furnish evidence still more conclusive, perhaps, than in the other case, of their being of equal if not older date than the bones themselves, for besides that they were found in a layer of vegetable mould, which was covered twenty feet in thickness with alternate layers of sand, clay, and gravel. One of the arrow-heads lay underneath the thigh-bone of the skeleton, the bone actually resting in contact upon it, so that it could not have been brought thither after the deposit of the bone, a fact which I carefully thought to investigate.

"The layer of vegetable mould was some five or six feet thick, and the arrow-heads and bones were found

buried in it, together with fragments of wood and roots and logs and cones of cypress, but no pebbles were observed in it. Above this layer of mould there were six undisturbed layers of clay, sand, and gravel, viz: three of greyish clay and three of pebbly gravel mixed with coarse sand, in all twenty feet in thickness, and a forest of old trees was standing on the surface soil. The bottom is still subject to occasional overflow, in very high stages of water."*

SECTION OF THE MASTODON BED ON THE POMME-DE-TERRE BRANCH OF THE OSAGE RIVER, MISSOURI.

	Feet.	*Inches.*
Loam	3	6
Gravel		10
Yellow clay	4	
Gravel		10
Blue clay	3	
Gravel		10
Peat	3	
	16	00

Resting on loam, which contained the remains of the mastodon.

The position of the ground would indicate that it was originally an erosion in the pre-existing surface, and filled with fluviatile deposits. Several springs of a brackish sulphur water come to the surface, to which the animals of the country resorted, and the area is provincially known as a "lick." This lick is estimated to have yielded not less than eighty distinct skeletons.

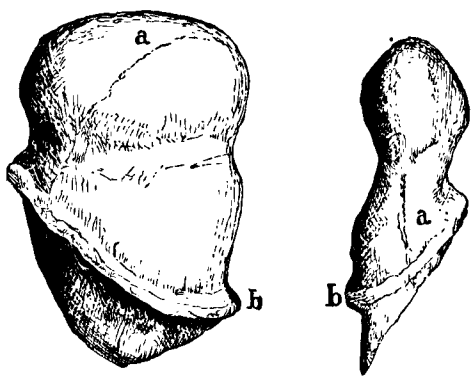
Stone-hatchet (?) in the Modified Drift of Jersey County, Illinois. — Professor Worthen, the Director of the Geological Survey of Illinois, in his detailed report of Jersey County, has described the Löess and Modified Drift as filling the lateral valleys to a depth varying from sixty

* "Transactions St. Louis Academy of Sciences," vol. I., p. 62. 1857.

to one hundred feet, and the Modified Drift, he states, often contains bands of sandstone and conglomerate. "One of the most satisfactory natural sections observed in the county, was found on Otter Creek, on the lands of Mr. McAdams, where the beds had been cut through by the waters of the creek. The exposure at this locality exhibited about twenty feet of yellowish-brown clay at the top, below which was seen from twenty to thirty feet of sand and gravel with boulders; and this was underlaid by about fifteen feet of blue plastic clay, extending below the bed of the creek. Boulders of granite, sienite, greenstone, quartz-rock, and porphyry are often met with."*

From a mass of these cemented pebbles and sand, which had become detached and had fallen to the margin of the stream, the hatchet was procured which is represented in the annexed figure.

FIG. 3 — ½.



Stone-hatchet (?) from the Modified Drift of Jersey County, Illinois.

Mr. William McAdams, who forwarded to me the specimen and had described the mode of its occurrence

* "Geological Survey of Illinois," vol. iii, p. 106.

before the Jerseyville Scientific Association, in his letter states that "it was so tightly fastened in the rock that it required considerable force to break it out. The position in which it lay, and the depth to which it was imbedded in the rock will at once be made plain by examining the relic." A portion of the cemented gravel adhered to the specimen when he first exhibited it to the Association.

There can be no doubt as to the geological position in which this specimen was found, and the only question is, Can it be of human workmanship? The material is a finely-crystallized sienite, and under a magnifier the three minerals, hornblende, quartz and feldspar, can be recognized. The portion which projected from the matrix has been so long exposed to atmospheric agents as to present a nearly uniform surface, except along the line *a*, which appears to be a thin leaf of more durable material, standing slightly out from the general ground; and the bold ridge *b*, which differs in no respect from the mass in chemical composition, and extends obliquely around the whole specimen. I can conceive that if the lower part had been imbedded in a conglomerate rock for a time, the upper part might have weathered so as to leave a projection, but this projection is equally prominent on the lower side. If this had been a finished hatchet, the workman would not have left the ridge which we have described, as it would have interfered with its cutting properties. On the other hand, it may be claimed that, after having worked out the head, he undertook to flake off a portion to form the edge, but the fracture extended too deep, and the work was spoiled; and the conchoidal nature of the fracture on one side, lends plausibility to this view.

On the whole, I will not positively assert that this

specimen is of human workmanship, but I affirm that if it had been recovered from a ploughed field, I should have unhesitatingly said that it was an Indian hatchet.

Pre-historic remains in Wyoming and Colorado.— Mr. E. L. Berthoud has recently described in the Proceedings of the Academy of Natural Sciences of Philadelphia,* the evidences of man's workmanship observed by him on the banks of Crow Creek, lat. 40° N., long. 104° W. While investigating the bluffs he found many beautiful moss agates, and numerous flakes of stone implements, mixed in Tertiary gravel and seemingly coeval with it. On leaving Crow Creek, he states:

"I obtained a complete suite of stone implements and rude fragments which occur mixed in a gravel and sand deposit that composes the summit and sides of the low bluff on the east bank. I found them in the gravel, in the soil, in every kind of position, and sometimes weather-beaten or stained by weather and rain. The accompanying gravel is composed of pebbles of quartzite, jasper, agate, granite, mica-slate, basalt, with a few shells, fossil wood or wood-opal; while in the low grounds at the foot of the bluffs, ancient fire-places, burnt fragments of bone and wood with flint and agate chips and implements, almost distinct from those on the summit of the low hills bordering Crow Creek, are observed. So much is this the case that the two seem to point to a distinct era, the latter presenting some progress and refinement even in stone implements.

"The evidences of the oldest and rudest do not even show traces of fire or fire-places; rough implements, irregular piles of pebbles are all that are left us to show and identify to the observer the obscure seat of a still more obscure barbarism.

* Part i, 1872.

"Another fact puzzles me, that whenever on Câche la Poudre, Big Thompson River, Clear Creek, Crow Creek, and Platte River, we find evidences of pre-aboriginal occupation, it is invariably on the low bluffs bordering these valleys, and in a Tertiary gravel deposit; but if we go back into the higher region of the prairies, they almost disappear, or present a difference in form or material.

"The shape, the location, the rude barbarism of these first attempts of art irresistibly lead us to compare them to the rude tools of Abbeville in France, or the implements of Kent in England. I am glad to be able to give a few shells from this place, which will serve to guide us in determining the age of the gravel beds of Crow Creek.

"We are fast nearing the high table-land between South Platte River, Crow Creek, and Pole Creek. This is a dividing ridge capped by conglomerate in many places, and under this on Low Wet, Little Crow Creek, etc., Miocene beds with Oreodon, Titanotherium, and fresh-water turtles. The gravel beds of Crow Creek may be Quaternary (?) but they seem made up from the decomposed capping north of us, and at Golden City apparently underlie the Newer Tertiary beds capped with basalt (?)."

Following up Crow Creek he noticed "in two places in the steep bluff bordering the stream the burnt stones and black carbonaceous remains of old fire places, from four to eight feet below the present surface."

On a small dry affluent of Crow Creek, he continues: "I found at the foot of the first ridge the evidences of the deserted site of an ancient village, the stone-heaps and circles, the projecting and polished boulders, the stray flint tools and weapons, the multitudes of broken flakes or fragments left in the primeval workshop; while

all around dispersed in rude circles, the boulders of quartzite, of jaspery rocks, yellow, red or grey, nowhere else *in situ*, speak of some method or manner of industry, totally unlike our modern Indian or Mound-builder's vestiges."

The shells referred to in the preceding account, according to Professor Cope, comprised four species, and were submitted to Mr. T. A. Conrad, who pronounced one of them to be a *Corbicula*, another *Rangia*, the third not determinable. The two species recognized are estuary shells "certainly not later than Older Pliocene, or possibly Miocene, but there is no trace of *Eocene*."

Pottery in connection with the bones of the Megatherium.—Dr. Holmes, several years ago, made a communication to the Philadelphia Academy of Natural Sciences, * in which he described the occurrence of fragments of pottery in connection with the bones of the mastodon and megatherium, on the Ashley River of South Carolina, but it is one of those isolated cases which require further investigation before full credence can be attached to it.

I have thus enumerated all the instances which have been recorded in the United States, where the remains of man have been observed in deposits which entomb also those of extinct animals. The evidence, it must be confessed, rests in most cases, upon the testimony of a single observer, and besides, there has not been that recurrence of "finds," in the same deposit (except in the gravel beds of Colorado and Wyoming, which require further investigation to command an unqualified belief), as in the valley of the Somme and in the European caves, which is so conclusive as to the existence of man as contemporary with the great pachyderms.

* "Proceedings," etc., July, 1859.

Our country is yet new, and much of its surface has never been disturbed by the labors of man. It is only recently that attention has been directed to these investigations, and those who are the most apt to make discoveries in this branch of knowledge — day laborers — are the least apt to appreciate their value. It is hardly to be expected that a competent observer will be present at the precise time when any relic of the past is disinterred. If such relic pertain to a horse or any other quadruped, we take the statement of the workmen with absolute trust; but if it were to prove of human origin, we discredit it. I have in my possession many drawings of relics *said* to be found under conditions which would indicate a very high antiquity, but to describe them would add, I conceive, nothing to the strength of this argument. With the evidence before us that both hemispheres have been subjected to the same dynamic action, and peopled in the northern latitudes by the same races of animals, often identical in species, is it not philosophical to infer that man also, who is capable of the most extended migrations, and of braving every climate, here found an abode in times primeval?

Descending to a period more recent, but still remote as compared with the chronological record, we have reported instances of man's existence as the contemporary of the present flora and fauna, but when the topographical features of the country were somewhat different.

Human skeleton found at New Orleans.— The plain, according to Dr. Dowler, on which New Orleans is situated, rises only nine feet above the sea, and excavations are often made below the level of the Gulf of Mexico. In these excavations successive forests of cypress trees have been passed through. In excavating

for the foundations of the gas-works in that city, it was necessary to cut through not less than four of these buried forests. At the depth of sixteen feet, the workmen came upon burnt wood and the skeleton of a man. It was beneath the roots of a cypress tree of the fourth forest level. The type of the cranium was of the aboriginal American race.*

Dr. Dowler divides the history of the delta into three epochs: 1, That of the grasses, as seen in the lagoons of the sea-coast; 2. That of the cypress basins; 3, That of the live-oak platform. Existing types, from the Balize to the highlands, show this order of succession, and all geological history proves that a very considerable period of time must elapse before the surface of the earth becomes fitted for the reception of a different kind of vegetation. Cypress trees (*Taxodium distichum*), ten feet in diameter, and whose age was computed at 5,700 years, were found in the lowest forest level, beneath which these human remains reposed. Dr. Dowler gives the following estimate of the periods of time which must have elapsed:

Epoch of the aquatic plants	1,500 years.
Epoch of the cypress basin, in which he assumes only two successive growths	11,400
Epoch of the live-oak platform	1,500
Total	14,400 †

Connected with the antiquity of these remains, is the age of the delta with regard to which great diversity of opinion prevails. Sir Charles Lyell, in his "Travels in North America," has undertaken to show that the deposits forming the delta and alluvial plain of the Missis-

* "Types of Mankind," p. 336.

† "Tableau of New Orleans." 1852.

sippi extend over an area of 30,000 square miles, and form beds in some parts, several hundred feet thick. "The lowest estimate of the time required would lead us to assign a high antiquity, amounting to many tens of thousands of years (probably more than 100,000) to the existing delta. Whether all, or how much of this formation may belong to the recent period, as above defined, I cannot pretend to decide."*

The late Professor Hitchcock estimated that "the Mississippi carries forward 28,188,383,892 cubic feet, or one cubic mile in five years and eighty-one days. The whole delta contains 2720 cubic miles, and therefore, at the rate above indicated, 14,204 years would have been requisite to form it."†

Referring to Humphreys and Abbot's work on the physics and hydraulics of this river, we find that many of the statements of previous writers with regard to its regimen, the area of its delta, etc., have been erroneous. Regarding the delta of the Mississippi as beginning where it first sends off a branch to the sea, it may be divided into four parts: 1, The Atchafalaya basin; 2, The Terre Bonne district; 3, The La Fourche district; 4, The Lake Pontechartrain district. The combined area is 12,300 square miles; or if we regard the alluvial tract between Cape Girardeau and the head of the delta, as above given, as part and parcel of the same, the area instead of being 30,000 square miles, is only 19,450. So, too, the thickness of the alluvial matter has been greatly overstated. It is but twenty or twenty-five feet, on the river bank, along the St. Francis Swamp; thirty-five feet, along the Yazoo Swamp; which thickness holds

* "Antiquity of Man," p. 43.

† "Smithsonian Contributions," "Surface Geology," by Edward Hitchcock, p. 92.

as far down as Baton Rouge; and the borings of the Artesian well at New Orleans show that there it does not extend more than forty feet below the level of the gulf.

The mean annual discharge of sedimentary matter equals one square mile of deposit, two hundred and forty-one feet in depth. Besides the amount held in suspension, the river pushes along into the gulf large quantities of earthy matter. No exact measurement of the amount furnished from this source can be made, but from the yearly rate of progress of the bars in the gulf, it is estimated that it would cover a square mile, twenty-seven feet deep.

The total yearly contributions, then, amount to a prism two hundred and sixty-eight feet in height with a base of one square mile. "To determine the age of the delta from such data, the extent of the area upon which the sedimentary matter is deposited, and the depth below the surface of the former bottom of the gulf must be known. Neither has been ascertained with sufficient accuracy to make the computation of any value."*

These authors infer that the original mouth of the Mississippi was near the efflux of Bayou Plaquemine, where the alluvial soil does not extend much, if any, below the level of the gulf, and hence that its prolongation has been two hundred and twenty miles. If it be assumed that the rate of progress has been uniform to the present day, the number of years since the river began to advance into the gulf can be computed. The present rate of progress of the mouth may be obtained by a careful comparison of the progress of all the mouths of the river, as shown by the maps of Captain Talcott,

* "Physics and Hydraulics of the Mississippi," p. 150, *et passim*.

U. S. Engineer, 1838, and of the U. S. Coast Survey in 1851, the only maps which admit of such comparison. They give two hundred and sixty-two feet for the mean yearly advance of all the passes, which represents correctly the advance of the river, because in the changes which take place, each pass in succession may become the main pass. Adopting this rate of progress, 4,400 years have elapsed since the river began to advance into the gulf.*

Thus, then, with these carefully observed computations before us, we are not prepared to accept the high antiquity assigned by Dr. Dowler to the human remains found beneath the surface at New Orleans. What he regards as four buried forests, which once flourished on the spot, may be nothing more than drift-wood brought down by the river in former times, which became embedded in the silts and sediments which were deposited on what was then the floor of the gulf.†

Human remains in a calcareous conglomerate, in Florida. —In Nott and Gliddon's "Types of Mankind,"‡ it is stated, on the authority of Agassiz, that Count Pourtales found the jaws and teeth, and some bones of the foot, belonging to man, in a calcareous conglomerate forming part of a series of coral reefs, which were supposed by that distinguished naturalist, in accordance with his mode of estimating the rate of growth of those reefs, to be about 10,000 years old. This statement, which has been widely copied, is essentially erroneous.

* *Ibidem*, p. 435.

† Since the above was written, I have seen the remarks of Professor C. G. Forshey, made before the New Orleans Academy of Sciences, in which he discredits the observations of Humphreys and Abbot, as to the nature of the river bed, the meagre thickness of the alluvium, and the insufficient age of the delta.

‡ Page 352.

Count Pourtales states: "The human jaws and other bones, found by myself in Florida, in 1848, were not in a coral formation, but in a fresh-water sandstone, on the shore of Lake Monroe, associated with fresh-water shells of species still living in the lake (*Paludina, Ampullaria, etc.*). No date can be assigned to the formation of that deposit, at least from present observation."*

Ancient hearths in the Ohio Valley. — Colonel Whittlesey thus states: "In 1838, in examining the fluviatile deposits on the Ohio River, at Portsmouth, Ohio, I saw in two places, in the east part of the town, the remains of very ancient fires. At low water, and thence up to a height of twelve and fifteen feet, is a bed of sand and transported gravel, containing pebbles of quartz, granite, sandstone, and limestone, derived partly from the adjacent Carboniferous and Devonian rocks, and partly from the Northern Drift, the upper part much the coarsest. On this is a layer of blue quicksand, from one to five feet thick, in which is a timber bed, including large numbers of the trunks, branches, stumps, and leaves of trees, such as are now growing on the Ohio, principally birch, black-ash, oak and hickory. Over the dirt bed is the usually loamy yellow clay of the valley, fifteen to thirty feet thick, on which are very extensive works of the Mound-builders. In and near the bottom of this undisturbed homogenous river-loam, I saw two places where fires had been built on a circular collection of small stones, a part of which were then embedded in the bank. The stones were colored red by heat, and among them was charcoal covered by clay, of which I have specimens. Around and near to the fire-beds, were what appeared to be the

* "American Naturalist," vol. ii, p. 434. 1868.

exterior membrane-like covering of river shells (*Unios*), but no shells. It was several rods from one of the charcoal beds to the other, and they were not on precisely the same level. They were from eighteen to twenty feet above low water, and about fifteen feet below the surface."*

Marine shells in the Alluvium of Ohio. — Francis Cleveland, C. E., who, in 1828, had charge of the excavation known as the "deep cut" on the Ohio Canal, informed Colonel Whittlesey that, at the depth of twenty-five feet in the Alluvium, several shells belonging to the species *Busycon perversum* were taken out.

The works of the Mound-builders. — Descending to times still more recent, and falling probably within the Historic Period, we find the evidences of man's existence vastly multiplied, and to such an extent that we can form reasonable conjectures as to his advancement in civilization, his mode of life, and his commercial intercourse. I refer to the Mound-builders. The surface of the country, during their occupancy of the Mississippi Valley, presented the same configuration which we now behold, nor were the conditions of climate essentially different. The long lines of earthworks stretching for miles, and often enclosing large areas of alluvial soil, are more recent, by ages, than the terraces which are often found in the immediate vicinity. The nature and extent of their works will be described in subsequent chapters.

* "On the Antiquity of Man in the United States," by Col. Charles Whittlesey. Transactions of American Association for Advancement of Science, Chicago Meeting, p. 283.

PARALLELISM AS TO THE ANTIQUITY OF MAN IN THE TWO HEMISPHERES.

Assuming as authentic the more obscure traces of human art and human remains found in the United States, I submit the following classification of the respective deposits:

MIOCENE (?)

EUROPE.	NORTH AMERICA.
Flints in Calcaire de Beauce, Pontlevoy, with Acerotherium, Mastodon, Dinotherium, Rhinoceros.	Flint flakes, etc., in the gravel beds of Colorado and Wyoming, with shells belonging to the genera *Corbicula* and *Rangia*. (Further authentication required.)
Flint flake in the beds of Aurillac, Auvergne, with the remains of *Dinotherium giganteum*, and *Machairodus latidens*.	
Hacked bones at Pouancé, Maine et Loire, with *Halitherium fossile*. (All these instances require further authentication.)	

PLIOCENE (?)

Hacked bones in the beds of St. Prest, associated with *Elephas meridionalis*, *Rhinoceros leptorhinus*, *Hippopotamus major*. (Evidence not conclusive.)	Human skull found in Calaveras County, California.

DRIFT *(closing period)*.

Epoch of the Extinct Animals.— Terrace gravels of the Somme, Seine, in France; Surrey, Kent, and Middlesex, in England, with flint implements, etc. The caves of France, Belgium, England, and Wales (in part) with flint implements.	Plummet from the San Joaquin Valley.
	Stone hatchet (?) found in Jersey County, Illinois.
	Löess of the Mississippi Valley, Natchez, enclosing *os innominatum* of man, with bones of extinct mammals.
Epoch of the Migrated Existing Animals (Reindeer Period). — Dordogne caves, France. Belgium caves (in part). Löess of the Rhine, not recognized in Great Britain. Skeletons, improved flint implements, etc., found with the remains of living and extinct mammals.	Flint implements found in the lacustrine deposit in the Osage Valley and Bourbeuse Valley, of Missouri, in connection with the bones of the mastodon.

CONTEMPORANEOUS TERRESTRIAL ANIMALS OF THE TWO CONTINENTS:

EUROPE.

Ursus spelæus (cave-bear).
**U. arctos?* (brown bear).
**Meles taxus* (badger).
**Putorius vulgaris* (polecat).
Felis spelæa (cave-lion).
Hyæna spelæa (cave-hyena).
**Canis lupus* (wolf).
Elephas primigenius(mammoth).
E. antiquus (elephant).
Rhinoceros tichorhinus (Siberian rhinoceros).
R. hemitæchus.
**Equus caballus* (horse).
**E. asinus* (ass).
**Cervus elaphus* (stag).
**C. capreolus* (roebuck).
**C. tarandus* (reindeer).
Megaceros hibernicus (great Irish stag).
**Bison europæus* (aurochs).
**Ovibos moschatus* (musk-ox).
Hippopotamus major, etc.

NORTH AMERICA.

Ursus americanus (bear).
U. amplidens.
Felis atrox (great lion).
Trucifelis fatalis (great tiger).
Canis indianaensis (wolf).
C. occidentalis.
**C. latrans.*
Elephas primigenius (great Siberian elephant).
E. americanus (mammoth of United States).
Mastodon americanus syn. giganteus (great mastodon).
Equus fossilis (horse).
E. major.
E. fraternus.
E. excelsus.
E. pacificus.
E. parvulus (Pliocene?).
Hipperion venustum.
**Cervus virginianus* (Virginian deer).
**C. canadensis* (elk).
**C. tarandus* (reindeer).
C. americanus (approaching the great Irish stag).
**Bison americanus* (buffalo).
B. priscus.
B. latifrons.
**Ovibos moschatus* (musk-ox).
O. bombifrons.
O. cavifrons.
Platygonus compressus (Suidæ).
Dicotyles lenis (Suidæ).
D. nasutus.
**Castor canadensis* (beaver).
Castoroides ohioensis (great beaver).
Megatherium mirabile.
Megalonyx Jeffersoni.
M. dissimilis.
M. validus.
Ereptodon priscus.
Mylodon Harlani.
Tapirus americanus (tapir).
T. Haysii.

* Those thus indicated are still existing.

RECENT.

Works of art, associated with the remains of Mammalia wild and domesticated, and for the most part common to the region.

Epoch of the Domesticated Existing Animals.

Shell-banks of Denmark (kitchen middens).

Stone implements in Danish (Scotch fir) peat mosses.

Lacustrine constructions in Switzerland (in part) of the Stone Age.

Clyde marine strata with canoes.

Human bones and works of art in the peat of the Somme Valley.

'Crannoges' of Ireland.

Works of art in the Nile mud.

Human skeleton in the delta of the Mississippi?

Ancient hearths in the alluvium of Ohio Valley. Shells of the *Busycon* in the alluvium.

Shell accumulations on the Gulf coast (in part).

MORE RECENT.

Bronze Epoch. — Bronze implements of Switzerland, Denmark, Ireland, and England.

Works of the Mound-builders of the Ohio and Mississippi Valleys.

Shell accumulations, marine and fresh-water, on the Gulf Coast and in the Interior (in part).

To the student of ethnology the bare catalogue above given of mammals that lived in the distant age of the Drift, as the contemporaries of man, would be unsatisfactory. The great Siberian elephant (*E. primigenius*), with his compound covering of wool and hair which fitted him to endure an arctic climate, is supposed to have appeared in Asia at the close of the Tertiary Period, whence he passed over to Europe during the Quaternary Period, appearing in England and France, and ranging as far south as Central Italy and the Pyrenees; while to the north, his carcass is often found encased in ice-cliffs, almost entire. He survived into the Reindeer Epoch.

"The preservation," says Sir Roderick Murchison, "of so many entire animals of this size in such high

northern latitudes, induces me to modify the views I formerly entertained,* and to suggest that all Northern Siberia, which is now so glacial, was, during the age in which the mammoth lived, a continent covered with a

FIG. 4.



The Siberian Elephant *(E. primigenius)* and Mastodon *(M. giganteus)* restored.

vegetation adequate to support vast herds of these huge animals, even up to 75° N. latitude. This view is, indeed, sustained by the researches which have been made from north to south, for when we travel southwards we find the mammoth remains becoming much scarcer, and instead of whole animals, we meet with their broken and disjointed bones only, as if they had

* Vide "Russia in Europe," etc., vol. i, p. 492, *et. seq.*

been transported from the north. Having satisfied myself by wide personal examination that other drifted materials which proceed from north to south, cover large regions of European Russia and Northern Germany —in places superseded by those great erratic blocks which were conveyed in former icebergs — and seeing in our own islands similar evidences, I now infer that the chief marshes of such marine drift were deposited whilst a prodigious change of climate was being effected over the northern hemisphere, large portions of which, like Northern Siberia, antecedent to such perturbations, were low lands, indented by marine estuaries, whilst other countries, like Russia in Europe, and Northern Germany, were then entirely under sea. The simple fact alone of the absence of all northern drift, or of any erratic blocks over all Siberia, is, indeed, in direct contrast to the state of the surface of European Russia, Northern Germany, and the British Islands, and shows us that when the great and possibly sudden changes of climate occurred, by which the mammoths were destroyed and entombed *in situ*, Northern Siberia was largely inhabited by those animals."*

I am not aware of the bones of the fossil elephant having been found in Europe, except in a single instance in Scotland, given by Lyell, in the old Glacial Drift, and it is not until towards the close of that period, the Terrace Epoch, that they are abundantly met with, in connection with the relics of man.

The remains of the *Elephas primigenius* occur on this continent under similar geological conditions. He probably appeared on the Pacific Coast during the closing period of the Tertiary, for there, as in Siberia, there is wanting all evidences of a great Glacial Epoch.

* "Address before the Royal Geographical Society," 1866.

At Eschscholtz Bay, Alaska, his remains, nearly entire, are found in the frozen mud-cliffs; and all the streams of that territory, as I am informed by Mr. Dall, are strewn with fossil ivory.

The *Elephas americanus*, whose remains appear in our river-gravels, and comminuted beds known as Löess, is closely allied to the *E. primigenius*, and such differences as our comparative anatomists have been able to detect, are probably due to variation, resulting from long isolation under modified conditions of soil and climate.

The Mastodon of the United States (*M. giganteus*)—another pachyderm which rivalled the elephant in size, but surpassed him in the massiveness of his frame—appears to have had, during the Post-pliocene Epoch, no representative on the European continent. According to our existing knowledge, he does not appear to have ranged north of the St. Lawrence Valley, but he can be traced south to the Gulf of Mexico. He evidently was fitted for a warmer climate, but not a tropical one, for the contents of his stomach which have been found well preserved, would indicate that he browsed on the branches of the fir, and other resinous trees. It is probable, too, as I long ago pointed out,* that the mastodon appeared subsequent to the great elephant and survived his extinction. No remains of the mastodon have been found in deposits older than the Löess, while those of the elephant are characteristic of the Terrace Epoch. The peat swamps are the great sepulchres of the former, as though the animal, while living, had become mired, and was thus left to perish on the spot, and the antiseptic properties of the peat have preserved to

* "Transactions American Association for Advancement of Science." Albany Meeting, 1856.

us many entire skeletons, with which our museums are enriched. The remains of the elephant, on the other hand, have been mainly found in river-gravels, as *disjecta membra*, floated from a distance by currents of water more or less turbulent; and the result is, that not a museum in the United States affords the materials for reconstructing the head of this great pachyderm.

While thus, then, the anatomy of the mastodon, in its minutest parts, is thoroughly understood, so far as relates to the fossil elephant we are compelled to base our determinations almost exclusively on the tusks and teeth. A perfect cranium would determine how far the *E. primigenius* of Europe deviated from the *E. americanus* of this continent.

The *Rhinoceros tichorhinus*, the Siberian rhinoceros, was closely associated in his range with the great Siberian elephant, and like him, had a compound covering of wool and hair. While three species of the rhinoceros inhabited Europe during the Quaternary Period, we find no representative of the genus in the United States, but going back to the Tertiary Period we find that there existed two forms of this mammal, one of which, *R. occidentalis* Leidy, was about three-fourths as large as the East Indian species, and the other, *R. nebrascensis* Leidy, was half as large.

The Musk-ox, or rather the musk-sheep, for he belongs to the *Capridæ*, lived in Central Europe simultaneously with the cave-dwellers, his remains having been found in the older alluvium of the Oise Valley of France, and in a similar deposit in the Valley of Avon, England. He is an animal whose range is restricted to the Polar region, and the presence of his remains in Central Europe is justly cited as conclusive proof, that since the advent of man, the climate of that region has under-

gone marked modifications for the better. At that period it must have been hyperborean almost to the northern border of the Mediterranean, where now flourish the olive and the vine.

The musk-ox has disappeared from Europe, and is now found only in the coldest parts of North America, seldom wandering south of the parallel 68, or further east than Melville Island. Dr. Kane observed their tracks and skeletons in the vicinity of Rensselaer Harbor, nearly as far north as man has been able to penetrate, and he conjectured that their range towards the pole was greater even than that of the reindeer.*

According to Sir John Richardson, the musk-ox does not exist in Greenland or Labrador, nor in the chain of islands extending north from the peninsula along the west side of Davis Straits, but inhabits the hilly "Barren Grounds," between the Welcome and Copper Mountains, from the 63d or the 64th parallels to the Arctic Sea, and northward to Parry's Islands, or as far as European research has yet extended. Herds of these animals travel from place to place in search of pasture, but do not penetrate deep into wooded districts, and are able to procure food, in winter, on the steep sides of hills which are laid bare by winds, and up which they climb with an agility which their massive aspect would lead one, ignorant of their habits, to suppose them to be totally incapable of. "In structure," continues Sir John, "they differ from the domestic ox in the shortness and strength of the bones of the neck, and the length of the dorsal processes which support the ponderous head. The swelling bases of the horns spread over the foreheads of both sexes, but are most largely developed in the old males. The musk-ox has also the

* "Arctic Explorations," vol. i, p. 81, note.

peculiarity of the want of a tail; the caudal vertebræ, only six in number, being very flat and nearly as short, in reference to the pelvis, as in the human species, the extreme one ending with the tuberosities of the ischium. A tail is not needed by this animal, as in its elevated summer haunts, musquitoes and other winged pests are comparatively few, whilst its close, woolly and shaggy hair furnishes its body with sufficient protection from their assaults." *

The only evidence, to my knowledge, of the occurrence of the remains of the musk-ox in a fossil state, on this continent, outside of his present range, is the brief statement of Dr. P. R. Hoy, of Racine, that it once existed in the State of Wisconsin.†

While there is no evidence, then, that the musk-ox ranged to the lower latitudes of the United States, there is conclusive evidence that there existed an allied form, but far surpassing him in magnitude, which seems never to have penetrated to the European Continent. This was the great *Ovibos bombifrons*, and perhaps the *Ovibos cavifrons*. Our eminent comparative anatomist, Dr. Leidy, classes these as two species, but Rütimeyer is disposed to merge them into one — the *O. cavifrons* representing the male, and the *O. bombifrons* the female. The great musk-ox ranged as far south, and even below, the confluence of the Ohio and Mississippi, for in the earthquake convulsions of 1811-12, which disturbed that region so profoundly, a cranium belonging to this species was thrown out from a fissure which formed near New Madrid, Missouri. I am not aware that, in its northern range, it has been found beyond Dubuque.

* Richardson's "Arctic Expedition," pp. 193, 194.

† "Transactions of the Wisconsin Academy of Sciences," 1870-2, p. 192.

The Reindeer (*Cervus tarandus*) is common to both continents. He appeared in Europe contemporary with the mammoth at the beginning of the Quaternary Period, but at a time when the mammoth was rapidly disappearing, this animal was vastly augmenting in numbers. In his feeding grounds, he closely conforms to the musk-ox. He formerly ranged as far south as the Pyrenees, but after the last great movement of the waters which deposited the "red diluvium," he retired to the coldest parts of Northern Europe, and to the wooded summits of the Caucasus and the Oural.

On this continent, according to Leidy, the reindeer is found in a fossil state as far south as Big-Bone Lick, Kentucky, also in New Jersey, and as far north as the frozen cliffs of Eschscholtz Bay, Alaska. How far the reindeer differs from the caribou, comparitive anatomists, I believe, have not fully determined; but I have seen the latter in living herds, upon the northern shore of Lake Superior, while De Kay has met with their *disjecta membra* in Northern New York.

The Great Irish Elk (*Megaceros hibernicus*) was the monarch of all the stag tribe. He exceeded ten feet in height, with antlers which spread from tip to tip, eleven feet. It is doubtful whether he can be traced back to the Pliocene Epoch, and he certainly became extinct at the time of the formation of the lacustrine marl which underlies the peat bogs. His remains are abundantly found in Ireland and England, and sparingly in France, as far as the Pyrenees; in Germany, as far as Silesia; and in Central Italy. The *Cervus americanus*, found in the Big-Bone Lick, Kentucky, according to Leidy, approximated to, if it did not exceed in size, this magnificent elk. A specimen disinterred at Waukegan, Illinois — destroyed in the great fire — from imperfect com-

parisons, nearly rivalled in height of stature and spread of horns, the great Irish elk.

The Aurochs (*Bison europæus*) appeared early in the Quaternary, and his remains are found among the pile-works of the Swiss Lakes. He still survives, thanks to the provident care of the Emperor of Russia, in the imperial forests of Lithuania.

The *Bison priscus* of Northern Europe is represented on this continent in the frozen mud of Eschscholtz Bay. Leidy has described two extinct species of buffalo as occurring in the United States, *Bison antiquus* and *Bison cavifrons*. Rütimeyer views the former as the male and the latter as the female of the *B. priscus*, but Leidy remarks that "this is reversing the usual order of things, for the more characteristic fossil first referred to, *B. latifrons*, is of much greater proportions than that referred to *B. antiquus*."

The American Buffalo may be allied to the *B. priscus*, the diversities being due to lapse of time and altered conditions of climate.

The Great Ox (*Bos primigenius*) appeared after the termination of the Tertiary Period, and is supposed by Rütimeyer to be the progenitor of our domestic ox, originating in Europe, and imported to this country in historic times. The wild cattle of Chillingham, England, are supposed to be the descendants of this ancient urus. In the time of Cæsar he existed in Gaul in a wild state, and is represented by him to be swift of foot and formidable as an adversary; whilst his descendant, under the effects of domestication, is slow, docile, and patient of toil, and of less massive structure, seen especially in the diminished size of the horns, which are no longer required as a means of defence. His organism, in every part, when his services are no longer required,

is appropriated to the wants and conveniences of man. Kind culture and regular supplies of food have modified his disposition and even his anatomical traits.

The Horse (*Equus fossilis*) appears in the Quaternary Period of Europe, and is thought to be the ancestor of the existing species (*E. caballus*), although smaller in size, resembling the variety now living in Iceland. He does not appear to have been domesticated by the cave-dwellers, but was very largely used for food. The remains of the same species of horse are found in this country, entombed in the frozen mud-cliffs of Eschscholtz Bay. There was also a large horse in the Southern States, described by Leidy as *E. major*, and on the Plains existed another species, described by Marsh as *E. parvulus*, which was less than three feet high. A large horse also existed on the Pacific Coast. The two latter may belong to the Pliocene Epoch. Besides these, there are two other species described, hardly distinguishable anatomically from the existing horse. I have a metacarpal bone of another species from the Drift of Iowa, which could not have exceeded four feet in height. Conspicuously, then, as the horse figures in our palæontology, yet he had so long disappeared from this country at the time of its discovery that the Indians had no tradition of his existence.

The Cave-lion (*Felis spelæa*) appears to have been of the age of the mammoth, and to have disappeared about the same time. Dr. Falconer, an eminent authority, conjectures that this great feline animal was the same as that which is now found on the slopes of the Altai and in the north of China, and which is supposed to be identical with the Bengal tiger, driven before the advance of civilization into inaccessible retreats. It may be the lion of Thessaly, as described by Herodotus,

which attacked the camels attached to the army of Xerxes.

Messrs. Boyd-Dawkins and Sanford regard this animal as the representative of the *F. atrox*, described by Leidy as occurring in a fossil state, near Natchez—some of the bones found in the caves of the Mendip Hills being apparently identical—but such a supposition seems hardly probable, in view of the restricted range of the *Felidæ* northward.

While in this country, the *Felis atrox* Leidy, larger than the existing lions, roamed along the Gulf Coast, there was another feline animal which frequented the coast of Texas, the *Trucifelis fatalis* Leidy, rivalling the Bengal tiger in size.

The Cave-bear (*Ursus spelæus*), the largest of the species known, according to Owen and Pomel, first made its appearance in England and France towards the end of the Tertiary Period, and became extinct before the Reindeer Epoch. It was abundant in Central Europe, the southern parts of Russia, and also in Italy, but its remains are wanting further north. According to Vogt, every gradation between the cave-bear and the common species (*U. arctos*), may be traced, and Mr. Busk has asserted recently, that the remains of the bear found in the British caves and gravels, are identical with the *U. ferox* or grizzly bear of the Rocky Mountains. In this country, we have two specimens of fossil bear, the *U. americanus* and *U. amplidens*, whose habitats were in a southern region.

The Cave-hyena (*Hyæna spelæa*) seems to have been an attendant on the Pre-historic Man, as his remains are abundantly met with in the caves of Europe. Whether he originated in the Pliocene Epoch of the Tertiary, is not known. While some maintain that he disappeared

during the Reindeer Epoch, others insist that he is but the spotted hyena (*Hyæna crotuca*) of Southern Africa. At all events, the change of his habitat indicates a vast change in physical conditions. In this country, we appear to have had no representative of this scavenger-like animal, the nearest approach to whom would be the prairie wolf (*Canis latrans*).

The *Suidæ* were represented on this continent during these times in the peccary and another allied form, while on the European continent we have the boar (*Sus scrofa*).

The Great Beaver (*Castoroides ohioensis* Foster), which ranged from Northern Illinois to South Carolina, finds no fit representative during this period in Europe.

In the review, thus far, of the fauna of the two continents during the Quaternary Period, it will be seen that those animals, such as the elephant, horse, bison, reindeer, musk-ox, etc., whose habitats fitted them to endure a high northern latitude, were common to both continents, which would imply that, at one time there existed an uninterrupted communication, probably by way of Behring's Strait. As we trace the range of this fauna on the respective continents, to its southern limits, we find it inosculating with tropical forms, which are widely diverse. Thus in Europe, are found the hippopotamus and hyena, whilst in the United States, we have the megatherium, megalonyx, the mylodon, and the tapir. From the presence of these fossil forms so far outside the tropics, it has been inferred that, even during the Drift Period, which must have been long-continued, there may have been an interval in which the climate was warmer than at present.*

* To those who would investigate our fossil mammals, I would commend the admirable and comprehensive work "On the Extinct Faunæ of

If we compare the faunæ of the Miocene and Quaternary Periods, as exhibited on this continent, particularly the land animals which are supposed to be peculiarly susceptible to atmospheric changes, we shall find that there are marked modifications of forms. Dr. Leidy, in his late work "On the Extinct Mammalian Faunæ of Dakota and Nebraska," states that, of the thirty-two genera of Miocene animals, not one occurs in the Quaternary formation. In comparing the Miocene and Pliocene faunæ with each other, as represented mainly by the remains of the Mauvaises Terres and the Niobrara River, scarcely a genus is common to both. "In view," he continues, "of the consecutive order and the close approximation of position of the two formations and faunæ, such exclusiveness would hardly be suspected." The greater similitude of the Miocene and Pliocene faunæ with the contemporaneous faunæ of the Old World, has led him to suggest that the North American continent was peopled during the Tertiary Period from the west. "Perhaps this latter extension," he continues, "occurred from a continent whose area now forms the bottom of the Pacific Ocean, and whose Tertiary fauna is now represented east and west by the fossil remains of America on the one hand, and of Asia, with its peninsula Europe, on the other."

Professor Asa Gray arrives at substantially the same results as to the distribution of the flora of the two continents during the Tertiary Period: "The occurence of peculiarly North-American genera in Europe, might be best explained on the assumption of early interchange

Nebraska," etc., by Dr. Joseph Leidy, whose labors, extending through a long series of years, have aided so much in elucidating this department of our Natural History.

and diffusion through North Asia, rather than by the fabled Atlantis." *

The topographical features of the two continents, as well as the hydrographical soundings of the two oceans, render this supposition probable. Between Ireland and Newfoundland there is a great plateau which an elevation of the earth's crust to the extent of a few thousand feet would convert into dry land; and Behring's Strait, which now separates Asia from North America, is at its narrowest point, but thirty miles wide, and its shallowest depth is but twenty-five fathoms. Many of those mammalian types, represented by the Proboscidians and Ruminants contemporary with the elder man, originated during the Pliocene Epoch. None of these large animals could have passed over the strait which now divides the two continents, and the close alliance of form would indicate a common origin. We infer, therefore, that a subsidence during or preceding the Drift Epoch cut off the communication, and the refrigeration which then took place served to disperse the colossal animals, who sought by migration to lower latitudes a climate congenial to their nature.

Lyell has remarked that it is truly wonderful how the primitive man, in such an inhospitable climate, taking shelter in caves and grottoes, in possession of no more formidable weapons than have yet been unearthed, and surrounded by gigantic and ferocious animals, which he was compelled to hunt for his sustenance, could maintain his existence under such adverse circumstances. This record clearly shows that he possesses traits which place him immeasurably above all other animals.

Man by nature is almost the weakest and most de-

* "Address as President of American Association for Advancement of Science," Dubuque, 1872.

fenceless of beings. Brought forth in sorrow, he requires for a long time nutrition from the mother, and a long tuition to enable him to walk. How different from the young of other animals! It is necessary that his food be cooked, and that his body be artificially clothed; and in these respects, too, he differs from the other mammals. In the acuteness of the senses and in muscular development, he is confessedly inferior. The flea has a thousand times his agility; the passenger pigeon, in a half-hour will pass over an intervening space which to man would be a toilsome day's march. The condor, soaring so high in the air as to appear a mere speck, can sight his prey on the surface, while to man it would be invisible at the distance of a thousand feet; and in the paw of the lion is concentrated the strength of a score of prize-fighters.

But man is endowed with reason, by the exercise of which he makes up for all these deficiencies, repels or subdues all other animals, and places himself at the head of creation. He soars in the air above the eagle's flight; he sounds the depths of the sea beyond the fishes' range; he outstrips the pigeon in his flight over the land; his vision, aided by art, pierces the realms of space infinitely deeper than that of the condor's; and by the pressure of his fore-finger, exerting less strength than would be required to lift a pound weight, he stretches the lordly lion in the dust. Other animals have a restricted geographical range, but man is found amid the icebergs of the north, and beneath the burning heat of a tropical sun. Is it singular, then, that a being thus endowed and so far capable of protecting himself against climate and disease, should be able to survive changes which have extinguished other mammals?

NOTE.—It is probable that, in the New World, as in the Old, we shall

detect the earliest traces of man within the tropics. Dr. Lund, a distinguished Swedish comparative physiologist, in a paper which will be hereafter referred to (p. 301), has described human crania as occurring in the bone-caves of Brazil, associated with the remains of extinct genera and species of quadrupeds, and more recently, in 1860, Mr. James S. Wilson, at various points along the coast of Ecuador, found pottery, vessels, images, and other implements highly wrought, and some even in gold, in a stratum of ancient surface earth, which was covered with a marine deposit six feet thick, which he considers as old as the Drift deposit of Europe, and identical with that of Guyaquil, in which the bones of the mastodon are met with. He traced six terraces in going up from the sea through the province of Esmeraldas towards Quito, and in all cases these relics were found below high-tide mark, which proves that this region, after human occupancy, must have been submerged and again elevated to its present position ; a process which must have involved a very considerable lapse of time. In no region of the earth have relics indicating so high a degree of skill, been found in deposits so old ; but this statement, though accepted by Murchison, requires verification. (Address before the Royal Geographical Society, 1862.)

CHAPTER III.

THE MOUND-BUILDERS — THE GEOGRAPHICAL DISTRIBUTION OF THEIR WORKS.

THE evidences of the former existence of a pre-historic race, known as the Mound-builders, who at one time occupied the prineipal affluents of the Mississippi, the Gulf Coast, and the region of the Great Lakes, are too conclusive to admit of doubt. These evidences consist of tumuli symmetrically raised and often enclosed in mathematical figures, such as the square, the octagon, and circle, with long lines of circumvallation; of pits in the solid rock, and rubbish-heaps formed in the prosecution of their mining operations; and of a variety of utensils, wrought in stone or copper, or moulded in clay, which evince a knowledge of art and methodical labor foreign to the Red man. While the character of these structures, as traced over wide areas, differs in minor particulars, still there is a general uniformity which stamps the authors as one people and subjects of one controlling government.

The Mound-builders were, in the distinctive character of their structures, as marked a people as the Pelasgi, whose pre-historic works can yet be traced throughout Greece and Italy. These Pelasgi were the "Wall-builders," for wherever they went, they threw up fortifications made of polygonal blocks, known as cyclopean,

and aptly fitted together without cement or mortar. Their unwarlike character led them to shun the open combat, and the numerous *Larissas* or strongholds define the points at which they paused in their migrations. So we can track the Mound-builders by their structures from the shores of the Great Lakes to the milder regions of Mexico and Central America.

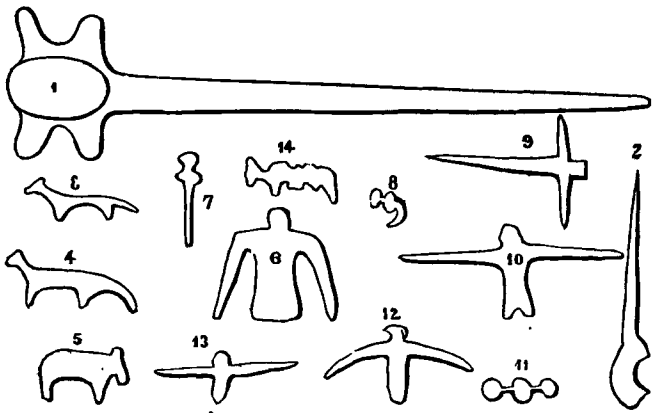
Ancient works in the Northwest. — The northernmost limits to which the Mound-builders penetrated, so far as their vestiges have been observed, were Isle Royale and the northern and southern shores of Lake Superior.* They do not appear to have made permanent settlements, but to have resorted to those regions during the summer months, for the purpose of mining copper. Proceeding south, we find their mounds at frequent intervals along the western shore of Lake Michigan, and in the interior along the water-courses which flow into the Mississippi.

The mounds of Wisconsin differ so widely from those found in other sections of the country, that some observers have been led to infer that they were constructed by a different race, but Lapham finds general resemblances which connect them with a common origin. These differences consist in the fact that, instead of the predominant type being circular or pyramidal, the forms for the most part consist of imitations on a gigantic scale of animate objects which were characteristic of the region, such as the buffalo, bear, fox, wolf, and otter, among the mammals, and of the lizard and turtle, among the reptiles; of the eagle and night-hawk, among the birds; and, in many instances, the human form is unmistakably portrayed.

* Mr. D. Gunn describes some mounds observed by him in the valley of the Red River of the North. (Smithsonian Report, 1867.)

Dr. Lapham's attention was called to the peculiar character of these mounds as far back as 1836, and he communicated the fact of their existence to the public, through the newspapers of the day. In 1838, Mr. R. C. Taylor contributed an article on their occurrence to "Silliman's Journal," accompanied by plans of surveys; and subsequently, Dr. Locke, in the Geological Report of Iowa and Wisconsin, embodied information which greatly enlarged our knowledge of these structures; but in 1855, Dr. Lapham, under the auspices of the Smithsonian Institution and the American Antiquarian Society, brought out a work,* illustrated by numerous plates, which is replete with all the information to be desired.

FIG. 5.



Animal Mounds of Wisconsin.

No. 1. This is called by Lapham, a "Turtle" mound, and is pronounced by him to be a fine specimen of mound-building. It occurs at Waukesha, and its dimensions are as follows: Length of body, 56 feet; length of tail, 250 feet; height, 6 feet.

* "Antiquities of Wisconsin," "Smithsonian Contributions to Knowledge."

Nos. 2 and 7 also occur in this vicinity, and are what our author calls "Lizard" mounds, and some of them are remarkable for having curved tails. (Fig. 8.)

No. 9. At Trenton, occur the Cruciform figures. One cross is 185 feet long in the trunk; the head 24 feet; and each arm 72 feet. The height is about 4 feet, and the width 28 feet.

Nos. 3 and 4. These forms, which occur at Mayville, are pronounced by Lapham horse-like, but as the horse was unknown on this continent during the Mound-builder Epoch, I am disposed to regard them as fox-like.

No. 5 is undoubtedly designed to represent a bear, and is one in a group of mammal and bird-like forms which occur on the dividing ridge between the Kickapoo and Mississippi Rivers.

No. 12 is one of the bird-like forms in the above group.

No. 6 is another bird-like form known as the "Spread Eagle."

No 14 is the form of a buffalo. This figure is often duplicated in a long line, which is designed to represent the procession-like movement of these animals.

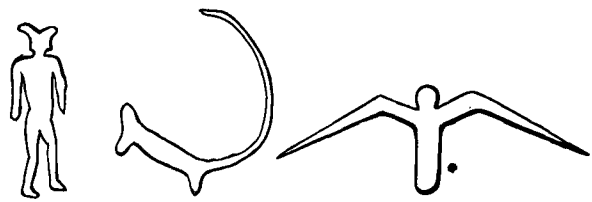
No. 6 and 10 represent winged forms which occur on the Fox River of Illinois, above Burlington.

These animal forms attain no great elevation, their height varying from one to four feet above the surrounding prairie; nor are they, in all instances, thrown up as basso-relievos, but are sometimes represented intaglio.

To represent the various groupings of these animal forms would far transcend the limits of this work, and I have therefore contented myself with selecting such as are predominant, premising that they are not restricted to a single locality, but are reproduced at numerous points in the southern counties of Wisconsin.

Mr. W. H. Canfield has given figures of mounds in Sauk County, representing living forms which differ somewhat from any of those above described.

FIG. 6.



Animal Mounds of Wisconsin.

No. 1 represents a man in the act of walking, one foot being partly raised. The figure is 214 feet long.

No. 2 represents an animal with a wondrous length of tail — 320 feet — while the body is about 160 feet.

No. 3, Mr. Canfield regards as representing the night-hawk, the expanded wings reaching 240 feet.*

These animal mounds occur abundantly in the valley of the Lower Wisconsin River, and about the Baraboo Rapids.

Squier and Davis mention two instances of their occurrence in Ohio; the "Great Serpent," in Adams County, "with its head conforming to the crest of a hill, and its body winding back for 700 feet, in graceful undulations, terminating in a triple coil at the tail;" and the "Alligator," in Licking County, whose length "from the point of the nose following the curves of the tail to the tip, is about 250 feet, the breadth of the body 40 feet, and the length of the legs or paws, each 36 feet." †

* "Sketches of Sauk County, Wisconsin."

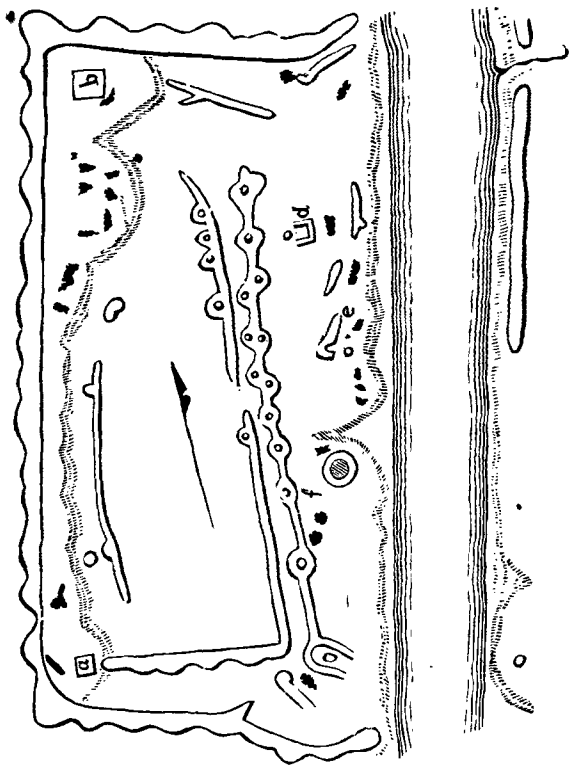
† "Ancient Monuments," pp. 97, and 99.

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FIG. 7.

PLAN OF THE ANCIENT WORKS AT AZTALAN, W

Surveyed by Dr. I. A. LAPHAM, 1850.



Length of inside trench of south line ..... 700 feet.
" " " west line ..... 1,419 "
" " " north line ..... 637 "

The deeply-shaded parts represent excavations.

a, b, c, d, Pyramidal structures.

e, f, Deep depressions. *g.* Ruins of mud-huts.

"The main feature of these remains," adopting the language of Dr. Lapham, "is the enclosure or ridge of earth, extending around three sides of

an irregular parallelogram, the west branch of Rock River forming the fourth side on the east. The space thus enclosed is seventeen and two-thirds acres. The corners are not rectangular, and the embankment or ridge is not straight. The earth of which the ridge is made, was evidently taken from the nearest ground, where there are numerous excavations of very irregular form and depth; precisely such as may be seen along our modern railroad and canal embankments. . . . The ridge or wall is about twenty-two feet wide, and from one foot to five in height. The wall of earth is enlarged on the outside, at nearly regular distances, by mounds of the same material. They are called buttresses or bastions, but it is quite clear that they were never designed for either of the purposes indicated by these names. . . . They are about forty feet in diameter, and from two to five feet in height. On the north wall, and on most the west wall, they have the same height as the connecting ridge, but on the south wall and the southern portion of the west wall, they are higher than the ridge, and at a little distance resemble a simple row of mounds. . . .

"On opening the walls near the top, it is occasionally found that the earth has been burned. Irregular masses of hard reddish clay, full of cavities, bear distinct impressions of straw, or rather wild hay, with which they have been mixed before burning. These places are of no considerable extent, nor are they more than six inches in depth. Fragments of the same kind are found scattered about, and they have been observed at a great distance from these ancient ruins. This is the only foundation for calling these brick-walls. The bricks were never made into any regular form, and it was even doubtful whether the burning did not take place in the

wall, after it was built. The impression of the grass is sometimes so distinct as to show its minute structure, and also that it was of the angular stems and leaves of a species of *Carex*, still growing abundantly along the margin of the river. As indicating the probable origin of this burnt clay, it is important to state, that it is usually mixed with pieces of charcoal, partially burnt bones, etc. Fragments of pottery are also found in the same connections."*

The highest point in the interior of these works, according to the above-cited authority, is at the south-west corner, and is occupied by a square truncated mound *a*, which when seen from the high ground at *e*, presents the appearance of a pyramid, rising by successive steps, like the gigantic structures of Mexico. The level area on the top is fifty-three feet on the west side, and was probably originally square. There was a road-way leading from the mound towards the east, at the point *c*.

At the north-west angle of the enclosure *b*, there is another similar structure, sixty by sixty-five feet on the top, with the remains of a graded way at the southeast corner, and also another square structure at *d*.

The rings or circles connected with the ridges, about two feet high, are supposed to be the remains of mud-houses; the materials of the walls having fallen in, left only a circular mound of earth to mark the original site.

There are two excavations, *e* and *f*, the first triangular and the last circular, which, from their greater depth, regular shape, and distance from the walls, were not made in the process of obtaining materials for the structures. That at *e* is so deep and the soil so tenacious,

*"Antiquities of Wisconsin," p. 42.

that water stands in the bottom of it much of the time. The circular ridge at *f*, consists, doubtless, of the materials thrown out in digging. Besides the burnt clay, charcoal, fragments of pottery, and human bones, which have been revealed to the explorer of these works, Mr. Boynton, who resides in the vicinity, states, that several feet below the surface of the large square mound *b*, was found what appeared to be the remains of cloth, apparently enveloping a portion of a human skeleton. Its texture was open, like the coarsest linen fabric, but the threads were so entirely rotten as to make it quite uncertain of what material it was made.*

The animal mounds of Wisconsin are associated with those of a circular form, but the latter nowhere attain a conspicuous height, and, with the exception of those at Aztalan, they are devoid of enclosures. There is nothing to indicate, according to Lapham, that they were erected for defensive purposes.†

In the vicinity of Chicago, the mounds, whilst abundant, are inconspicuous but of exceeding interest, inasmuch as they have yielded skulls of a singular conformation, which will be hereafter described.

Ancient works on the Upper Mississippi. — Crossing to the Mississippi, where it forms the boundary between Iowa and Illinois, we find both banks, at frequent intervals, crowned by ancient works, for the most part in the form of circular mounds, rising to no great height, and invested by no earthen walls. In the region of Dubuque and Dunleith, they rarely attain a height of more than twelve feet, and sometimes are only two or

* Ibidem, p. 47.

† To those who wish to study the minute details of these structures, I commend the admirable work of Dr. Lapham, from which these details have been extracted.

three feet, so that it requires a practised eye to distinguish them from the accidents of the soil.

The subordinate valleys of the Rock River, the Fox, Kankakee, and Illinois, show abundant evidences of former occupancy by the Mound-builders, and whilst the mounds are inconspicuous, they are not destitute of relics, and the human remains are indicative of a race whose skulls are marked by peculiarities which distinguish them from the Red man.

In the lower valley of the Missouri, Professor Swallow, in some MS. notes kindly placed at my disposal, remarks that mounds occur on the bluffs at the mouth of Moniteau Creek; also above Boonville, in a similar position; and between that point and the mouth of La Mine River. Stone mounds were observed by him on the naked rock bluffs of the Osage River above Warsaw. They were about twenty feet in diameter and five feet high. Similar mounds were observed by Mr. Conant on the Gasconade. These probably are of a more recent origin than the earthen mounds. Stone heaps are found in the "Cherokee Country" of the South, where their origin is directly traceable to the Indians.

Professor Swallow also observed earthen mounds on the Kansas River at the mouth of the Republican, and at Manhattan at the mouth of the Blue River. In none of these instances were they enclosed by walls.

The site of St. Louis was originally so thickly studded with ancient works that it acquired the title of "Mound City." In the American Bottom, on the Illinois side of the Mississippi, there is a vast assemblage of mounds, and the whole series cannot fall much short of two hundred in number. They are isolated, or in other words, not invested with lines of circumvallation, as in the Ohio Valley. They present, too, a variety of forms:

some are oblong, some square, some ellipsoidal, and some conical. The group lying between Alton and East St. Louis, is computed to contain not less than sixty structures, in which was included the great mound of Cahokia, the monarch of all similar structures in the United States. When this magnificent mound was in all its integrity, for alas! it has been swept away by the levelling influence of modern improvement, it rose up in the form of a parallelogram with sides at the base, respectively 700 and 500 feet in length, to the height of 90 feet. On the southwest there was a terrace 160×300 feet, which was reached by a graded way, and the summit was truncated, affording a platform 200×450 feet. From this platform rose a small conical mound about 10 feet high, which, on exploration, yielded human bones, funeral vases, and various implements of stone. It is probable that upon this platform, was reared a capacious temple, within whose walls the high priests, gathered from different quarters at stated seasons, celebrated their mystic rites, whilst the swarming multitude below looked up with mute adoration.

The entire area occupied by this mound, comprised about six acres, and in close proximity were four elevated platforms, varying from 250 to 300 feet in diameter. The subordinate mounds were rich in relics, as attested by many collections in the hands of persons residing in the vicinity.

The great mound of St. Louis, which it was found necessary to remove in 1869, was thirty-five feet high —about the height of the celebrated mound at Marietta, Ohio.

On the banks of the Merrimac River, fifteen miles southwest of St. Louis, on the farm of a Mr. Lamb, were discovered a vast number of low tumuli, which, when

explored, were found to contain stone slabs, forming the several sides of graves in which were contained human skeletons. This incident is mentioned by Priest, who wrote as far back as 1834, but he adds the improbable statement that these skeletons indicated a race of pigmies.

Seventy miles below St. Louis, in the vicinity of Chester, Illinois, there is an ancient cemetery, described by Dr. Winzelius,* in which the grave-hills are but slightly heaped up. Each grave when explored is found to contain a cist, enclosing a skeleton for the most part far gone in decay. These cists are built up and covered with slabs of limestone, which here abound.

On the opposite side of the river, in Perry County, Missouri, similar cists are found, and often near the head of the corpse, beautiful specimens of pottery in the form of drinking vessels, statuettes, and funeral urns are encountered, some of which I shall figure under an appropriate head. This mode of burial has not been noticed in the upper portion of the Ohio or Mississippi Valleys, but in the region of the junction of these two rivers, it was not uncommon.

Dr. H. F. Harper, of Merom, Indiana, in some MS. notes communicated to me, describes similar stone cists as occurring at that place. There are mounds in that vicinity, in which the ordinary mode of burial was practised by heaping up the earth, and hence it has been inferred, erroneously, I think, that there have been two distinct races of people, apart from the Red man, who successively occupied that region.

Mr. E. O. Dunning has observed similar cists in the Chilhowee Valley, in Tennessee. "They are built," he says "of slabs of slate, nicely fitted together, about

* "Proceedings of the St. Louis Academy of Sciences."

three inches thick, four feet long, and two feet broad, enclosing receptacles not of uniform space—generally 5×4×2 feet, covered by flat pieces resting upon upright slabs, and conforming to the rounded corners of the tomb. They were found to contain, for the most part, fragments of human bones, too much decomposed to be removed in considerable portions, implements of stone, and broken vessels of clay. . . . Charcoal, ashes, and burned clay indicated that fire had been used at the burial, by which the bones and many other relics were consumed."*

It would seem that the great naturalist Lesueur was the first to observe this mode of interment in some of the mounds in the vicinity of New Harmony, Indiana, and communicated the fact to Prince Maximilian, who recorded it in his "Travels in North America."

To show how widely-separated peoples often adopt the same mode of burial, I may quote the testimony of Mr. Bateman, who has recorded the systematic opening of more than four hundred British tumuli. "The fundamental design is pretty nearly the same in most places; the leading feature of these sepulchral mounds is, that they enclose either an artless stone vault, or chamber, or stone chest, otherwise called a *kistvaen*, built with more or less care, and in other cases, a grave cut out more or less below the natural surface, and lined if need be, with stone slabs." †

Ancient works on the Lower Mississippi. — There are evidences which would lead us to believe that the junction of the Ohio and Mississippi Rivers was the seat of the Mound-builders' empire; not that the mounds are the most conspicuous, or the investing lines are more

* "Smithsonian Report," 1870.

† Cited by Lubbock, "Pre-historic Times," pp. 335-336.

intricate — for the latter are almost entirely absent — but it formed a radiating point between widely separated regions. The navigable streams were the great highways, and when we glance at a map, and trace the courses of the various tributaries of the Great River, we see how vast a region could be traversed by an easy and expeditious communication, without resort to artificial constructions. The relics, too, and especially the pottery, indicate a higher style of art than is observed elsewhere. A series of low mounds occur in Mississippi County, Missouri, twelve miles from the battle-field of Belmont, on the Cairo and Fulton Railroad. These, so far as explored, are rich in relics of a high order of art, such as water-jugs and statuettes, some of which I shall describe in a subsequent chapter.

The mounds in the vicinity of New Madrid have been explored by Professor Swallow, and were found to be remarkably rich in pottery and stone ornaments. The results, I am advised, will ere long be given to the public.

There are many mounds, according to Humphreys and Abbot,* in the St. Francis bottom, some of which are reported to be very large. A collection of them is to be seen on the premises of Mr. Edmondson, about fifteen miles from Memphis, on the line of the Little Rock and Memphis Railroad. Scattered over them are fragments of pottery, and many curiosities are turned up in ploughing, such as jugs, hatchets of flint or hard slate, human bones, etc.

With respect to the southern extension of these ancient works, Mr. Edward Fontaine remarks: "That part of the Mississippi Valley including the area between the Cumberland Mountains, where they terminate near

* "Physics and Hydraulics of the Mississippi," p. 54.

Tuscumbia and Florence, and the mouth of Big Black River, and which embraces the valleys of the upper tributaries of the Tombigbee, with the country watered by the Wolf River, and all the affluents of the Yazoo and Big Black, was once densely peopled by the Mound-builders. All the more fertile parts of the lands of the Choctaws and Chickasaws, which lie within the limits of Mississippi, and formerly in a part of Alabama and Tennessee, show the former occupancy of a much more numerous and more highly civilized race, whose remains are found wherever I have examined the rich lands of the West, between the Alleghany and the Mississippi. The whole valley from Cairo to the mound of Pointe a la Hache, on the bank of the river fifty miles below New Orleans, is full of them. They are found not only on the Ohio and the Trinity River of Texas, but in every situation between these points, which would be selected as a favorable spot for planting and farming, by a skillful agriculturist of the present age. The Choctaws and Chickasaws did not claim the builders of these tumuli as their ancestors, and knew nothing about their history." *

Mr. Fontaine claims that this ancient race, if they did not cut numerous channels, at least constructed "levees" to control and utilize the bayous of the Mississippi for the purposes of agriculture and commerce. The Yazoo River, whose valley is interspersed with prehistoric monuments, in the Choctaw language, is called *Yazoo-ok-hinnah* — The River of Ancient Ruins.

The tumuli of this region, conspicuous examples of which are to be seen near Florence, in the valley of the Tennessee River, are of the truncated pyramidal form. They are constructed with a geometrical precision, and

* "How the World was Peopled," pp. 278-9.

their sides correspond with the cardinal points. One of these mounds, seen by him in 1847, when little mutilated, he describes as being nearly seventy feet high, and covering an acre of ground.

He also describes a group of mounds in Chickasaw County, Mississippi, which are in the form of a truncated pyramid, enclosed in an irregular earthen wall or ditch, and occupying six acres of ground.

The great mound at Seltzertown, Mississippi, is of such dimensions as almost to preclude the belief of its artificial origin. It is a truncated pyramid, about 600 feet long and 400 broad at its base, and covering nearly six acres of ground. It is placed very nearly in reference to the cardinal points, its greater length being east and west. Its height is forty feet, accessible by a graded way, which leads to a platform of four acres on the summit. From this platform rise three conical mounds, one at each end and one in the centre. Both of the extreme mounds are truncated, the westernmost rising to the height of forty feet, and the easternmost is somewhat less. Eight other mounds, inconspicuous in size, but placed at regular intervals, are traceable. The great mound itself or the platform from which rise these minor structures, is surrounded by a ditch of an average depth of ten feet.

Dr. Dickeson, in exploring the mound, found numerous skeletons and specimens of pottery, including vases filled with pigments, ornaments, ashes, etc., indicative of burnt offerings. The north side of the mound is supported by a wall of sun-dried bricks, two feet thick, filled with grass, rushes, and leaves. Angular tumuli mark the corners which were formed of large bricks retaining the impression of human hands.* Professor

* "Ancient Monuments," etc. pp. 117-118.

Swallow has also observed the imprint of human hands in the clay which enters into some of the ancient structures in the region of New Madrid.

In some of the older works which treat of the antiquities of the United States, we frequently find allusions to a magnificent city which, at one time, was supposed to exist within the limits of Arkansas. Minute explorations, however, have not confirmed this belief. The pre-historic ruins in this State are not conspicuous for their magnitude, but differ somewhat in the mode of their construction from what has been observed elsewhere. Professor Cox remarks that, "In Phillips county there are many remains of old fortifications or aboriginal towns to be seen — monuments of a by-gone race, of whose history no tradition known to the white man, has been preserved by the occupants of the country. One of these ancient works of art, four miles west of Helena, at the terminus of Crowley's Ridge, was visited. The embankments, now nearly destroyed by the washing of the rains and a cultivation of a part of the lands, were built of sun-dried bricks, mixed with stems and leaves of the cane. The vegetable structure of the cane is still well preserved in the clay matrix, and I could, in no instance, find any evidence of the cane having been charred by the fire; hence the conclusion is, that it received no greater drying heat than that given by the sun. Nor is there any appearance of finished brick, of which it has been said this wall was built. The clay and stems of cane appear to have been mixed together and moulded into a wall, somewhat after the manner of *pesé*. The northern boundary of the enclosure is formed by the hills, and within the interior there are a number of small mounds. Old Town, fifteen miles below Helena, on the Mississippi River,

derives its name from the evidence afforded of its having been the site of an aboriginal village."*

At Cave Hill, Washington County, there is a stone fortification — a wall of loose rubble — whose origin has been referred to the Spaniards, but their leader, De Soto, could hardly have constructed, in a hasty march through the country, all the works which are ascribed to him.

Mounds in the Southwest. — To be able to trace these structures with their distinctive features to the confines of Mexico, becomes a strong link in the chain of national affiliations. Professor C. G. Forshey, whose labors as a physicist in connection with the hydraulics of the Mississippi, and the many public works executed by him in the Southwest as a civil engineer, have prominently identified his name with all questions relating to the antiquities and physical geography of the Lower Mississippi Valley, has kindly placed at my disposal his MS. notes relating to the character and geographical distribution of the mounds in that region, from which I shall make liberal extracts in the progress of this work. I desire to express my thanks for this unqualified appropriation of the abundant materials which he had accumulated during a long scientific career.

Many years ago he described a group of mounds, accompanied by a plan, situated on Prairie Jefferson, Louisiana,† the largest of which is 180 by 35 feet at the base, and attains an elevation of 40 feet, with a level area on its summit 51 by 45 feet, which is reached from the west by a winding graded way. Connected with these works are two artificial reservoirs, formed by

* "Report on the Geology of Arkansas, vol. ii, p. 414.

† "American Journal of Science," vol. xlix, p. 38. See also "Ancient Monuments," etc., p. 113.

throwing up lines of earth around them, by which the builders could command a perennial supply of water.

Recurring to his MS. notes, he says: "Mounds! mounds!! yet without number. I have described many, figured many, surveyed many, *pari cursu*, which I have never had time to copy, or even to turn back to, in my note-books. Right before me, in my field-notes of seven surveys, in October, 1871, is a rich group rudely figured, that I had not seen before, though often passing near them. . . .

"The first of these groups is some fifty miles above Vicksburg, on the west bank of the Mississippi, two miles back, on the estate of Dr. Keene Richards, called Transylvania.

"The temple, which is the central figure of twelve mounds, looms up grandly from the level of the alluvial plain. Arrow-heads and pottery have always been abundantly found on these mounds. I made no excavations. One of them is used as a cemetery for the colored population of the plantation.

"The next set, or village mounds, lies some twenty miles nearly due south, on the same side of the river, but about seven miles back, on Walnut Bayou, embraced in the Compton estate. I made an extemporaneous survey of these mounds in 1850, but have not access at this time to my journals, in which the survey has slumbered. The temple, in this case, is not so large, but is, I think, thirty-five feet high, with variable slopes. Half a dozen smaller mounds are grouped around the central object.

"The third set of mounds I surveyed with some care, and described in 1840, with a topographical drawing made of them at the time. I think there are ten mounds in a form nearly circular, facing the temple. The largest

is similar to the largest in the Compton group. They are on the Hollywood plantation, on the southwest bend of Lake St. Joseph — one of the 'old river lakes' — in the parish of Tensas.

"All over the alluvial region north of Red River, and up that river, there are occasional isolated mounds, besides groups. Of the latter, by far the greatest is that at Trinity — the junction of the Ouachita, the Tensas, and the Ocatahoola Rivers, — in the parish of Catahoola, Louisiana. They are about thirty miles west-southwest from Natchez, and on the right bank of the river below the triple junction which forms the Black River. In this group, the great temple is about 1,500 feet from Black River, and 800 feet from Little or Ocatahoola River, and is 42 feet high to the plane square crown — a conical tumulus 40 feet in diamater on the summit, looking at a distance like a female breast and nipple, — a similitude which strikes every beholder. This group alone, of all the mounds I have ever seen south of the Ohio River, has a causeway or breastwork around it for defence, which is continued across from Black to Little River. The embankment may have been raised as a levee to keep the back water from the rear of the group, but if so, it is very insufficient, since all the river-banks were left open. The temple has a base of more than one acre — some 300 feet square.

"From this point, along the right bank of this stream up to Ocatahoola Lake, fifteen miles distant, there are a number of mounds of like magnitude, with the minor ones arranged round the temple, perhaps twenty or more, manifestly of like character, and erected by the same people.

"One notable fact is of great value as probably connecting these mounds with the Natchez Indians. Read

Le Sage du Pratz, whose writings I consulted at the time, and satisfied myself that, after the massacre of the French at Natchez, in 1729, these people took refuge on Little River, and either built these mounds or denuded them of their forests, settling upon and occupying them. The French, learning a year or two thereafter of their place of refuge, ascended the Mississippi in boats, and then deviating through the Red and Black Rivers, suddenly came upon the poor Natchez and put them to the sword.* These are the most westerly mounds in Louisiana, except far up the Red River, above Grand Ecore.

* The Natchez Indians, so far as I can gather, were first visited by La Salle, 1681-82; and Tonty, his faithful lieutenant, entering the great town of the Taensas, an allied people, gazed at it with astonishment. "He had seen nothing like it in America: — large square dwellings, built of sun-baked mud, mixed with straw, arched over with a dome-shaped roof of canes, and placed in regular order around an open area. Two of them were larger and better than the rest. One was the lodge of the chief; the other was the temple, or the House of the Sun. . . . The Frenchmen repaired to the temple, wherein were kept the bones of the departed chiefs. In construction it was much like the royal dwelling. Over it were rude wooden figures, representing three eagles turned towards the east. A strong mud wall surrounded it, planted with stakes, on which were stuck the skulls of enemies, sacrificed to the sun. . . . There was a structure in the middle which Membré thinks was a kind of altar, and before it burned a 'perpetual fire,' fed with three logs, laid end to end, and watched by two old men devoted to the sacred office." (Parkman, "Discovery of the Great West," p. 277.)

Charlevoix, who followed after, describes their chiefs as claiming to be the "Children of the Sun,"— as combining in their office the civil and sacerdotal powers. Temples were erected upon the foundations of the mounds, where the people assembled on stated occasions, and lodges were set apart in which was maintained the "eternal fire." The Natchez Indians, now extinct, distinguished by religious observances, and possessed of a language which had no affinity, so far as observed, with those of surrounding tribes, are supposed by many, to have been a remnant of the Mound-builders.

Du Pratz has but followed the observations of his predecessors, when

"There are several large mounds twenty miles west of this group, on the east bank of Little River, only a mile or two above its mouth, where it passes into Lake Ocatahoola. They stand on a bluff some forty feet above the river. One is about one hundred feet square at the base, with very steep sides, and covered with the ordinary pine forest. It is the only mound with stone masonry in its structure, which I have seen south of the Ohio. A caving face exposed blocks some twelve to eighteen inches in size, rudely carved or broken in shape, supporting its steep sides. The stone was taken from the immediate vicinity — the soft sandstone of the Tertiaries, or, perhaps, the indurated materials of the Drift, as seen at Grand Gulf.

he describes the Natchez Indians as sun-worshippers; as having temples in which were maintained "perpetual fires," and whose chiefs were high-priests, claiming descent from the sun; whose dwellings were reared upon mounds; and who ruled with despotic sway.

Professor Forshey states that before he had known of these mounds, he met in Philadelphia (1840), Mr. Peter S. Duponceau, who has done so much in tracing out the affinities of American language. The great linguist asked him, a citizen of Natchez, with regard to the traditions touching the Natchez Indians, but never having read Du Pratz, he was dumb. Duponceau said that the Natchez and "White Apples" were one and the same people. The latter, Professor Forshey knew about, as he had been upon their mound-houses — twelve miles southeast of Natchez — on Second Creek, and their customs had been well described by Sir William Dunbar, and Winthrop Sargent, who was the first Governor of the Mississippi Territory. Duponceau said that only a few of the Natchez Indians were left after the massacre on the Ocatahoola (?) and these few became mingled with the Caddos and the Delawares, he thinks, or with the Alabamas.

When he returned, he read Du Pratz, and examined until he satisfied himself that the last place of refuge and the scene of the massacre, was as above stated; but whether they built the mounds or only occupied them, was a matter of doubt. Certainly there were no trees upon them older than a century, while all around were trees which from their size indicated a growth of four or five centuries.

"Below Natchez, near the bluff on the alluvial bottom, and only a thousand feet from its base, a mound of some fifty feet square on the summit and with steep sides, twenty-five feet high, stands up isolated in the swamp. The trees, not very large, grow over it. Such positions are not unusual, and yet they appear uncalled for, since the bluffs rise up one hundred and fifty feet high in the immediate vicinity.

"There is another mound, similar in form and position, near the mouth of St. Catharine's Creek, fifteen miles below, on the Laurel Hill estate of Dr. Mercer. These are among the many surveys and observations made by me more than a quarter of a century ago, and are described from memory.

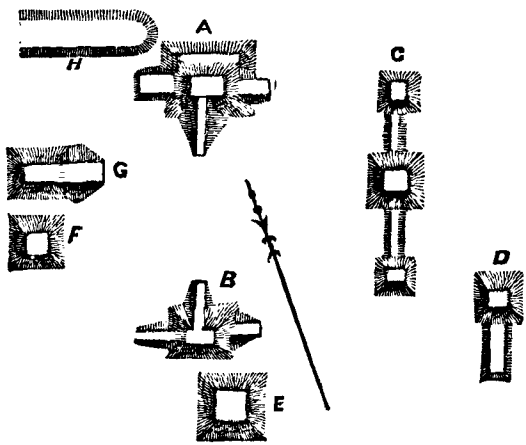
"A large number of mounds are distributed over the Atchafalaya basin, which I have not personally examined. In the rear of Baton Rouge, and all along the uplands of Lake Pontchartrain, are many small mounds, indicative of the vestiges of a pre-historic race."

"Upon the high and gently undulating banks of Bayou Gros Téte," according to Humphreys and Abbot, "there are ten or twelve earthen mounds, arranged mostly in groups of two or three. The largest of these is at the mouth of Bayou Fordoche, it being conical in shape and rising to the height of twenty-five feet. There are two mounds, situated about eight hundred feet apart on the north bank of this bayou, about two miles above Rosedale, both of the same dimensions, having the form of a square truncated pyramid, twelve feet in height, the slope of the sides being about 2.5 upon 1, and the length of each side, on the top, being about fifty feet. The western mound had a ramp on its eastern side, with a slope of about 3.5 upon 1." *

* "Physics and Hydraulics of the Mississippi," p. 433.

As an illustration of the platform mound, which is predominant in the Southwest, I introduce the following plan of a group in Madison Parish, Louisiana, made by Mr. James Hough, for Mr. McBride, of Ohio, and incorporated in the work of Squier and Davis:*

FIG. 8.



PLATFORM MOUNDS, MADISON PARISH, LOUISIANA.

A, the largest mound, is 250 yards distant from Walnut Bayou. It is 225 by 162 feet at the base, and 30 feet high, with a level area on the summit, 120 by 75 feet. On the north, it has a terrace 10 feet wide and extending the entire length of the mound. On the south, it has an avenue 20 feet broad, reaching to the top. At each end is an inclined platform 75 by 60 feet.

B is a mound less elevated, 180 by 120 at its base, and 15 feet high. The area on the summit is 120 by 60 feet. A graded way leads to the top from the north. At the east end is a similar approach 75 by 60 feet, and 8 feet high, where it joins the main structure. At the west end is a similar way 120 by 60 feet.

C is a similar mound, 96 feet square at the base, 10 feet high, with a platform of 48 feet square on the top. Two other mounds, each

* "Ancient Monuments," etc., p. 115.

60 feet square and 8 feet high, are connected with the main mound by elevated terraces, 40 feet by 4, the length of one being 125 feet, and the other 75 feet.

D is a less conspicuous mound, square in form, with a graded way from the south, leading to its summit.

E and F are square mounds which are, in a measure, isolated.

G is a double quadrangular mound, by no means conspicuous.

H represents the eastern extremity of a wall or roadway running parallel with Walnut Bayou, 3 feet high, 75 feet broad, and 2,700 feet in length. Upon either side of this roadway are depressions in the nature of a ditch, and in one place they are so deep as to give origin to a pool of water.

"There is a class of mounds," remarks Professor Forshey in his MS. notes, "west of the Mississippi Delta, and extending from the Gulf to the Arkansas and above, and westward to the Colorado in Texas, that are to me, after thirty years' familiarity with them, entirely inexplicable.

"In my Geological Reconnoisance of Louisiana, in 1841–2, I made a pretty thorough report upon them. I afterwards gave a verbal description of their extent and character before the New Orleans Academy of Sciences. These mounds lack every evidence of artificial construction, based on implements or other human vestigia. They are nearly all round, none angular, and have an elevation hemispheroidal, of one foot to five feet, and a diameter from thirty feet to one hundred and forty feet. They are numbered by millions. In many places, in the pine forests and upon the prairies, they are to be seen nearly tangent to each other, as far as the eye can reach, thousands being visible from an elevation of a few feet.

On the Gulf marsh margin, from the Vermillion to the Colorado, they appear barely visible, often flowing into one another, and only elevated a few inches above

the common level. A few miles interior they rise to two and even four feet in height. The largest I ever saw were perhaps one hundred and forty feet in diameter, and five feet high. These were in Western Louisiana. Some of them had abrupt sides, though they are nearly all of gentle slopes. There is ample testimony that the pine trees of the present forests antedate these mounds. The material for their construction is like that of the vicinity everywhere, and often there is a depression in close proximity to the elevation."

Professor Forshey then proceeds to state that he encountered hundreds of these mounds between Galveston and Houston, and between Red River and the Ouichita; that they were so numerous as to forbid the supposition of their having been the foundations of human habitations; that the burrowing animals common to the region piled up no such heaps; and finally that the winds, while capable of accumulating loose materials, never distribute them in the manner above-mentioned. In conclusion, he adds, "In utter desperation I cease to trouble myself about their origin, and call them 'inexplicable mounds.'"

Ancient works on the Gulf Coast.—From the Mississippi River, these ancient structures are traced through the Gulf States to Florida. Those occurring on the Etowah River, in Alabama, were first described in "Silliman's Journal," by Mr. E. Cornelius.* The principal mound, enclosed in a semicircular ditch, is described as attaining an altitude of over 75 feet, and over 1,200 feet in circumference at its base. It is truncated, and has a graded avenue leading to its summit.

On the Etowah River, near Cartersville, Georgia, there is, according to Mr. M. F. Stephenson, a group of

* Vol. i, p. 223.

ten mounds, situated in the bend of the stream, and protected on the land side by a moat, which is from twenty to thirty feet deep. The central mound is square, and measures one hundred and fifty feet on the top, with a raised platform on the east side, twenty feet high and forty wide—evidently where sacrifices were offered, as a sandstone idol was ploughed up on it, together with excavated discs or mortars, six inches in diameter, and of translucent quartz, elegant in workmanship, stone-axes, a small native-copper vessel, perforated shells (which are found in all the mounds), mica mirrors, and the only gold beads ever found—native gold being found in the neighborhood. This mound is eighty-eight feet high, and a few rods from it is a circular one, sixty feet high which twenty years ago had a parapet on the top five feet in height. The remainder are only about twenty feet high.

At the Falls of Little River, near the Alabama line, according to the same authority, in the crest of the fall, are three chambers hewn out of the solid sandstone; and at Nacoochee, the crest of a conical hill was cut off at about fifty feet, so as to embrace an acre and one-half, which, on two sides, is quite precipitous, and on the others has a ditch and wall; the latter was formerly six feet high, enclosing about twenty acres.

At Macon are stupendous remains; also in Campbell County, on the Chattahoochee. The Yond Mountain, 4,000 feet high, of solid granite, is a cone crested with trees, but perpendicular on all sides, except one space which is walled with stone; so is the Stone Mountain, which is, 2,360 feet high, and accessible on one side only, which is also walled.*

Ancient works in the Ohio Valley.—The ancient earth-

* "Smithsonian Report," 1870.

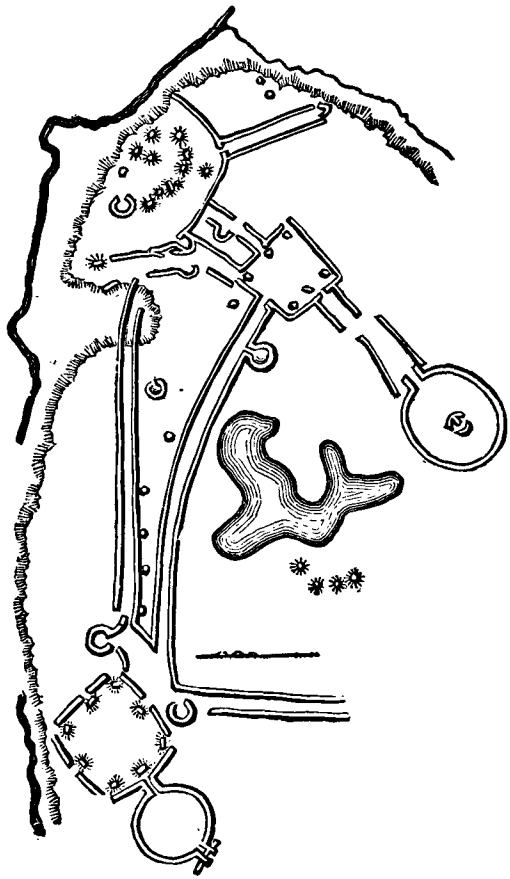
works in this valley have been so elaborately described by Squier and Davis, that I shall only refer to their labors so far as may be necessary to illustrate the ethnography of the United States. Not only are the banks of the Ohio at frequent intervals, crowned by these structures, but those of the subordinate streams, such as the Wabash, the Scioto, the Miami, and the Muskingum, entering from the north; and those from the opposite side, such as the Kenawhas, the Cumberland, and Tennessee. The number of tumuli in Ohio alone is estimated by the authors before referred to at 10,000, and the number of enclosures at from 1000 to 1500. Ross County, of which Chillicothe is the capital, contains 100 enclosures and 500 mounds. These facts, I think, clearly indicate that this region must formerly have sustained a dense population, who derived their support mainly from agriculture.

In many of these works we meet with a feature which plays but a subordinate part in those before described, but which here becomes the most conspicuous, and impresses the beholder most forcibly as to the unity of design and mathematical precision which have been carried out in their construction. I refer to the elaborately-constructed walls of earth or stone, with which the mounds are enclosed. In these walls the geometrical figures of the square, the circle, the octagon, and the rhomb are represented; there are, too, gateways, parallel lines, outlooks, and other forms — the whole forming an intricate and yet harmonious system. I give two illustrations from Squier and Davis's admirable work, of the combination of mound and enclosure; the one occurring at Newark, and the other at Marietta, Ohio.

FIG. 9.

PLAT OF ANCIENT WORKS NEAR NEWARK, OHIO.

Scale, 2600 feet=one inch.



The most intricate, if not the most gigantic of all the Mound-builders' works, occur in the Licking Valley, near Newark. They occupy a plain between Raccoon

Creek and the south fork of Licking Creek, which is elevated from thirty to fifty feet above those water-courses, and extends over an area of two square miles. The subjoined plat is from a survey made by Colonel Whittlesey.*

I can only give a general description of the magnificent system of works here displayed. Starting at the south the observer finds himself enclosed in a nearly circular embankment twelve feet high and fifty feet broad at the base, with an interior ditch seven feet deep and thirty-five feet wide. At the gateway, which is marked by two parallel lines eighty feet apart, the parapets rise to the height of sixteen feet, with a ditch thirteen feet deep, making the altitude in the interior about thirty feet. These walls do not form a true circle, the respective diameters being 1250 and 1150 feet. The area enclosed is upwards of thirty acres; and this site was fixed upon, and none could be more picturesque, for holding one of the annual state fairs. In the centre is a mound in the shape of a huge bird-track, the middle toe being 155 feet, and the other two, 110 feet, in length. In front is a semilunar embankment, slightly elevated, which is about 200 feet in length. No one whose mind is susceptible to whatever is grand in nature or in art, can view with indifference this magnificent work; not in ruins, except so far as it may have been crowned with palisades, but as perfect as on the day of its abandonment. "Here," as Squier well remarks, "covered with the gigantic trees of a primitive forest, the work truly presents a grand and impressive appearance; and in entering the ancient avenue for the first time, the visitor does not fail to experience a sensation of awe, such as he might feel in passing the portals of an Egyptian

* "Ancient Monuments of the Mississippi Valley," p. 67.

temple, or in gazing upon the ruins of Petra of the Desert."

Passing out of the gateway, a broad passage lined by walls of no great height, leads to an irregular square, containing about twenty acres. A low mound marks each corner and also each central entrance, except in the west wall. From the northeastern gateway, there extend parallel lines connecting with a series of low walls, as intricate almost as a Cretan labyrinth, and there is an arched line of circumvallation, embracing numerous low mounds and one small circle. Near the centre of the northwest wall there is another gateway, with a broad and gently-curved avenue, leading to the octagon, which encloses an area of fifty acres. The angles of this structure are not coincident, although the sides are nearly equal. Opposite each entrance, there is a pyramidal mound, about five feet high, and eighty by one hundred feet at the base. From the gateway on the southeast side, parallels, three hundred feet long and sixty feet apart, conduct the observer into another *true* circle, about one-half mile in circumference, and enclosing an area of twenty acres. Outside the circle and opposite the gateway, there is a work of peculiar structure. "It would seem," remarks Mr. Squier, "that the builders had originally determined to carry out parallel lines from this point, but after proceeding one hundred feet, had suddenly changed their minds and finished the enclosure by throwing up an immense mound across the uncompleted parts. This wall which may be taken as constituting a part of the wall of the enclosure, is one hundred and seventy feet long, eight feet higher than the general level of the embankment, and overlooks the entire work."

From the octagon, parallel lines diverge southwest,

which may be traced for two miles. Similar parallels, nearly a mile in extent, diverge eastward, enclosing a series of circles about two hundred feet in diameter, together with a series of less diameter, and form a line of communication between the different parts of the system.

A pond occupying an area of about one hundred acres, now drained, existed just outside the works, and its western margin was marked by four inconspicuous mounds.

No one, I think, can view the complicated system of works here displayed, and stretching away for miles, without arriving at the conclusion that they are the result of an infinite amount of toil, expended under the direction of a governing mind, and having in view a definite aim. At this day, with our iron implements, with our labor-saving machines, and the aid of horse power, — to accomplish such a task would require the labor of many thousand men continued for many months. These are the work of a people who had fixed habitations, and who, deriving their support, in part at least, from the soil, could devote their surplus labor to the rearing of such structures. A migratory people, dependent upon the uncertainties of the chase for a living, would not have the time, nor would there be the motive, to engage in such a stupendous undertaking.

The ancient works at Marietta, are on nearly as grand a scale as those which I have described, a perspective view of which is given as a Frontispiece to this volume, being a reduced copy of the one prefixed to Squier and Davis's "Ancient Monuments."

When in the spring of 1788, the first settlers, under the Ohio Land Company's purchase, arrived at the mouth of the Muskingum, where they proposed to lay

the foundations of a town, they were astonished at these evidences of former occupancy by a people who had some claims to be ranked as civilized. The Directors passed a resolution, reserving the two truncated pyramids and the great mound, with a few acres attached to each, as public squares. The latter is now used as a public cemetery; and the rites of Christian burial, as enacted there each year, are probably not more solemn and impressive than those which were enacted upon the same spot centuries ago, by a people whose very name and lineage have become lost.

These works, as shown by the survey of Colonel Whittlesey, occupy the river-terrace or second bottom, being bounded by the alluvium on the one hand and the hills on the other. The area covered is about three-fourths of a mile long, and half a mile broad. There are two irregular squares — one containing fifty acres, and the other twenty-seven acres, — together with the crowning work standing apart, which is a mound thirty feet high, elliptical in form, and enclosed by a circular embankment. The walls of the larger square, are between five and six feet high, and twenty or thirty feet broad at the base. Within the enclosure are four truncated pyramids, three of which have graded passage-ways to the summit. The largest is one hundred and eighty-eight feet long, one hundred and thirty-two feet wide, and ten feet high. These pyramidal forms are interesting, as establishing an affinity between their builders and those of the Gulf States, who, to a great extent, as has been shown, discarded the circular form. From the southern wall a graded way, one hundred and fifty feet broad, and lined by embankments from eight to ten feet high, extends for six hundred feet to the immediate valley of the Muskingum.

The walls bounding the smaller square, are less conspicuous, and there is an absence of all pyramidal structures, but at the entrance of each gateway there is a low circular mound. From the central gateway in the southeast wall, there is an embankment extending nearly to the entrance of the circle which encloses the great mound, and to the south and east, at an early day, similar embankments could be traced, crowning the brow of the terrace which is here delta-shaped.

The great mound at Grave Creek, West Virginia, the most conspicuous of all the mounds in the Ohio Valley, will be described in a subsequent chapter.

The great mound near Miamisburg, Ohio, sixty-eight feet high and eight hundred and fifty feet in circumference, far surpasses in dimensions that which the Greeks erected over the body of Patroclus:

> "They, still abiding, heaped the pile.
> An hundred feet of breadth from side to side
> They gave to it, and on the summit placed
> With sorrowing hearts the body of the dead."

Grottoes occupied by Mound-builders.— The conglomerate at the base of the Coal Measures, and other formations in the Ohio Valley, often crop out in bold ledges, and in many places have weathered into deep recesses with overhanging roofs, thus forming grottoes, which were undoubtedly used by the Mound-builders for shelter, and also for sepulchres, but it is difficult in most instances, to discriminate between their vestiges and those of the modern Red man.

About two miles west of Rome, Perry County, Indiana, in the Ohio Valley, according to MS. notes placed in my possession by Professor E. T. Cox, in one of the rock houses, formed by a projecting ledge of Sub-carboniferous sandstone, fifty feet in thickness without a

visible seam (interposed between the two horizons of Archimedes limestone), occur two ancient graves, the dimensions of which are about $4\frac{1}{2} \times 2\frac{1}{2}$ feet, oval in shape, and planted with flat stones sloping inward, which form a perfect casing throughout. One had been dug into, exposing fragments of a human skeleton, but the other remains intact. The bottom of the rock house is made up of fragments of stone which have fallen from the overhanging roof, intermixed with clay. This deposit has not been penetrated in the search of human relics. Without the line of the eaves' drippings, is a mass of sandstone, 3×8 feet, tumbled from above, in which, and running with the rift, are two mortar-like excavations about two feet apart, ovoidal in shape, 6×8 inches, and tapering down to the depth of 20 inches. Two excavations of a similar character were observed by Professor Cox, near Leopold, and he was informed that others exist near Rome. Their position far above the neighbouring streams, and their direction in reference to the bed rock of the region, convinced him that they were not "pot-holes" formed by an imprisoned boulder, but that they were of artificial origin.

According to the same authority, there is a high hill bordering the valley of the Saline River, in Illinois, on which there is a walled fort;—the walls being from four to five feet high, and enclosing less than an acre. On the south side, access is cut off by a precipitous descent, in the form of a cliff from forty to fifty feet in height, but on the north side, the slope is gradual and very rocky. The walls conform to the crest of the hill, which is very narrow, and the form of the fortified position is that of an irregular square. Inside a number of holes, now nearly filled, are seen which may have

been *câches* for storing provisions. A narrow and zig-zag passage, easily defended, leads down to the river. The inhabitants call this locality "Stone Fort."

The region embracing the mouth of the Wabash River, in Indiana, and the Kentucky shore opposite, including Greenup and Union Counties, is thickly studded with mounds. These were explored by the late Sidney S. Lyon, who in a private letter remarks, that he has seen the works of the Mound-builders in many States, but in no other locality has he ever seen anything to compare in extent and importance with those at this point. "If the mounds, ash-heaps, bone-beds, etc., are any evidence of a formerly populous and settled country, it is to be found here. In my examinations, I find nearly one hundred mounds in an area of one hundred acres."

Proceeding up the valley, we find the high banks of the river crowned at frequent points, by these ancient works. At Vincennes, the Wabash is bordered by a broad alluvial tract, and the bluffs of Löess attain a height of one hundred and fifty feet. The highest mounds occur near the line of junction, and I am of the opinion that the builders shaped into form some of the knolls formed at a time when the river extended to the foot of the bluffs. In 1859, according to Mr. William Pidgeon, it became necessary to remove a mound on the alluvial tract in the suburbs of the city. It was about sixteen feet in height, with a diameter of sixty-six feet, and a section exhibited five distinct strata. The first or lowest, consisted of a bed of human bones, arranged in a circle, eighteen feet in diameter, closely pressed together. Around the outer edge of this circle, the stratum was thinner than in the centre. Skulls, tibiæ, ribs, and vertebræ were promiscuously mingled, as though a pile of bodies had been heaped up. Over this

was a uniform layer of tough greyish clay, thirty-three inches in thickness, succeeded by a layer of what appeared to have been ashes, with occasional fragments of bone; and above this a twelve inch stratum of surface soil; and the whole was covered with clay. From the numerous skeletons disclosed in this excavation, and the promiscuous manner in which they were mingled, Mr. Pidgeon was disposed to regard this as a "battle-burial mound."*

The ancient works at Merom have been so elaborately described by Mr. F. W. Putnam, in the "Bulletin of the Essex Institute,"† that for the purpose of illustration, I shall incorporate the greater portion of his description. I do this for the additional reason that these mounds have yielded a number of skulls of a peculiar conformation, which will form the basis of certain ethnic speculations as to the character of the Mound-builder, and his affiliation with other distant and widely-disseminated peoples; and therefore, as to the nature of the structures, and the conditions under which these skulls were found, I am happy to avail myself of the observations of so competent an observer.

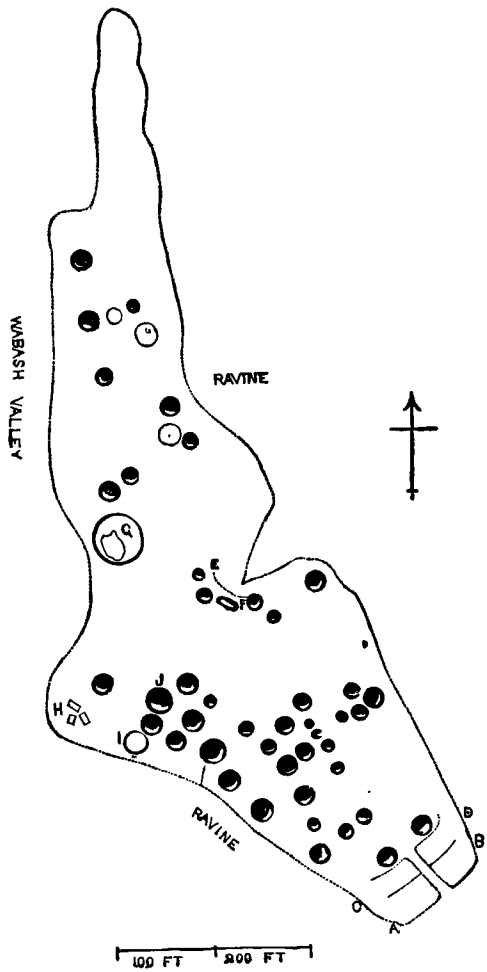
"The fort is situated on a plateau of Löess, about 170 feet in height above low water, on the east bank of the river. On the river side, the bank, which principally consists of an outcrop of sandstone, is very steep, and forms the western line of the fortification, while deep ravines add to its strength on the other sides; the weak points being strengthened by earthworks. The general course of the work is from the north, where it is very narrow, not over fifty feet, owing to the formation of the plateau, south along the river bank

* "Smithsonian Reports." 1867.

† Vol. iii. No. 11. Nov. 1871.

PLAN OF THE WORKS AT FORT AZATLAN,

On the Wabash River, at Merom, Indiana, reduced from a plan executed by J. H. Emerton, assisted by Messrs. Kearns and Collett.



about 725 feet to its widest portion (at H) which is here about 375 feet east and west. From this point it follows a deep ravine southerly about 460 feet to the entrance end of the fort. The bank traversed by the entrance road is here much wider than at other portions, and along its outer wall, running eastward, are the remains of what was evidently once a deep ditch. The outer wall (A, B) is about 30 feet wide and is now about 1½ feet high; a depressed portion of the bank, or walk-way, then runs parallel with the outer wall, and the bank (C, D) is then continued for about twenty feet farther into the fort, but of slightly less height than the front. Through the centre of these banks there are the remains of a distinct road-way about ten feet in width.

"From the northeastern corner of this wide wall the line continues northwesterly about 350 feet, along the eastern ravine to a point where there is a spring, and the ravine makes an indenture of nearly 100 feet to the southwest. The mouth of the indenture is about seventy-five feet in width and the work is here strengthened by a double embankment (E, F). The natural line of the work follows this indenture and then continues in about the same northerly course along the banks of the ravine, to the narrow portion of the plateau about 550 feet to the starting point.

"There is thus a continued line, in part natural and in part artificial, which if measured in all its little ins and outs would not be far from 2450 feet.

"Besides the spring mentioned as in the indenture of the eastern ravine, there is another spring in the same ravine about 175 feet to the north of the first, and a third in the southwestern ravine about 125 feet to the west of the southwestern corner of the work.

"Looking at all the natural advantages offered by this location it is the one spot of the region, for several miles along the river, that would be selected to-day for the erection of a fortification in the vicinity, with the addition of the possession of a small eminence to the north, which in these days of artillery would command this fort. Having this view in mind, a careful examination was made of the eminence mentioned, to see if there had ever been an opposing or protective work there, but not the slightest indication of earthwork fortification or of mounds of habitation was discovered. . . . On crossing the outer wall, a few low mounds are at once noticed, and all around are seen large circular depressions. At the southern portion of the fort, these depressions, of which there are forty-five in all, are most numerous, thirty-seven of them being located south of a line drawn from E on the northern side of the indenture of the eastern ravine to the projecting extreme western point of the fort at H.

"These depressions vary in width from ten to twenty-five or thirty feet, and are irregularly arranged, as shown by the accompanying engraving, where they are represented by the black circles. One of the six depressions opposite the indenture of the eastern ravine is oval in shape, and is the only one that is not nearly circular, the others varying but a foot or two in their diameters.

"Two of these depressions were dug into, and it was found that they were evidently once large pits that had gradually been filled by the hand of time with the accumulation of vegetable matter and soil that had been deposited by natural action alone. In some instances large trees are now growing in the pits, and their many roots make digging difficult. A trench was dug across one pit (J) throwing out the soil carefully until the for-

mer bottom was reached at a depth of about five feet. On this bottom, ashes and burnt clay gave evidence of an ancient fire, and at a few feet on one side, several pieces of pottery, a few bones of animals, and one stone arrow-head were found. A spot had evidently been struck where food had been cooked and eaten, and though there was not time to open other pits, there is no doubt but that they would tell a similar story, and the legitimate conclusion to be drawn from the facts is, that these pits were the *houses* of the inhabitants or defenders of the fort, who were probably further protected from the elements and the arrows of assailants, by a roof of logs and bark or boughs. The great number of the pits would show that they were for a definite and general purpose, and their irregular arrangement would indicate that they were not laid out with the sole idea of acting as places of defence, though those near the walls of the fort might answer as covers from which to fire on an opposing force beyond the walls; and the six pits near the eastern indenture, in front of three of which there are traces of two small earth-walls, would strengthen this view of the use of those near the embankment.

"The five small mounds were situated in various parts of the enclosure. The largest (G) was nearly fifty feet in diameter and was probably originally not over ten feet in height. It had been very nearly dug away in places, but about one-fifth of the lower portion had not been disturbed. From this was exhumed one nearly perfect human skeleton and parts of several others that had been left by former excavators. This mound also contained several bones of animals, principally of deer, bear, opossum and turtles; fragments of pottery, one arrow-head, a few flint chips, and a number

of thick shells of Unios, two of which had been bored near the hinge. This mound has yielded a number of human bones to the industry of Dr. H. Frank Harper.

"The second mound (I) which was partly opened, was some twenty-five feet in diameter and a few feet in height, though probably once much higher. In this, a number of bones of deer and other animals were found, several pieces of pottery, a number of shells, and a few human bones. The other three mounds, one of which is not over ten or twelve feet in diameter and situated the furthest to the north, were not examined internally.

"The position of all the mounds, within the enclosure, which are indicated by the white circles on the cut, is such as to suggest that they were used as observatories, and it may yet be questioned if the human and other remains found in them were placed there by the occupants of the fort, or are to be considered under the head of *intrusive* burials by the latter race. Perhaps a further study of the bones may settle the point. That two races have buried their dead within the enclosure is made probable by the finding of an entirely different class of burials at the extreme western point of the fortification, indicated on the engraving by the three quadrangular figures at H. At this point, Dr. Harper, the year previous, had discovered three stone graves, in which he found portions of the skeletons of two adults and one child. These graves, the stones of one being still in place, were found to be made by placing thin slabs on end, forming the sides and ends, the tops being covered by other slabs, making a rough stone coffin in which the bodies had been placed. There was no indication of any mound having been erected, and they were placed slightly on the slope of the bank.

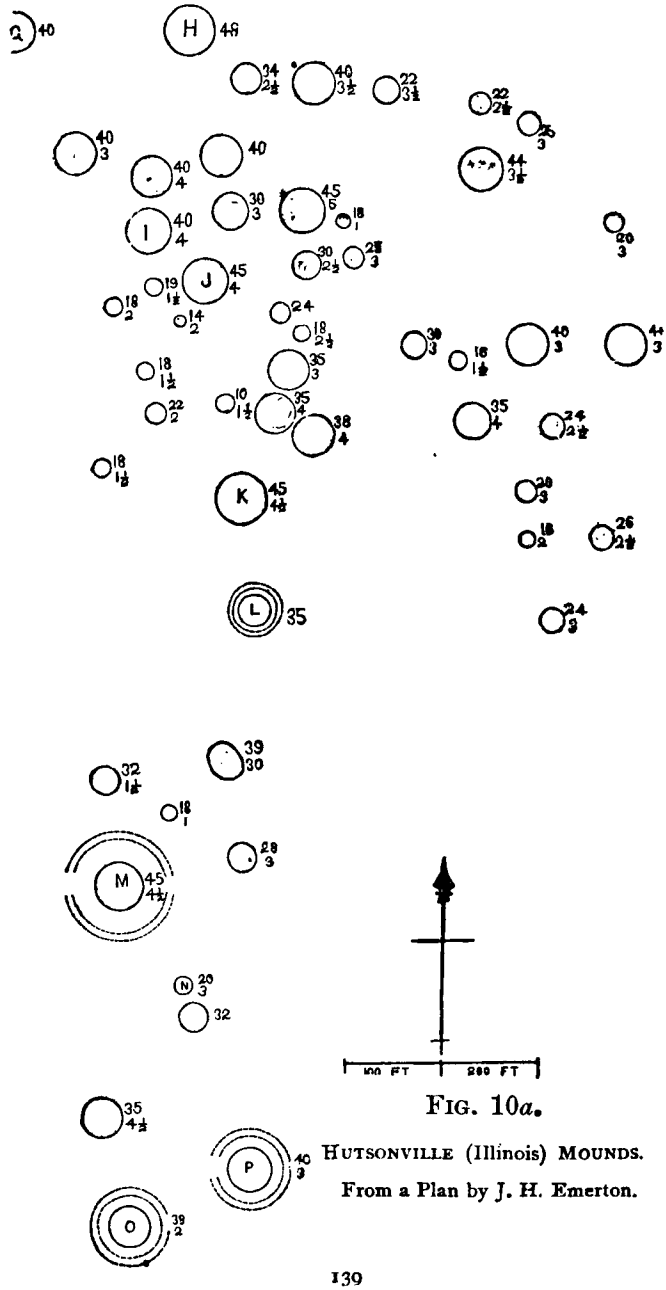


FIG. 10*a*.

HUTSONVILLE (Illinois) MOUNDS.
From a Plan by J. H. Emerton.

This kind of burial is so distinct from that of the burials in the mound, that it is possible that the acts may be referred to two distinct races who have occupied the territory successively, though they may prove to be of the same time and simply indicate a special mode adopted for a distinctive purpose."

"A group of fifty-nine mounds," according to the same authority, "is to be seen a few miles up the river from Merom, on the Illinois side. The relative position and size of the mounds in this group is shown by the preceding cut, from a plan made by Mr. Emerton, assisted by Mr. Collett. This group commences just beyond the river-terrace, and widens out to the east and west, covering a distance of about 1,000 feet from the mound, on the extreme east to that furthest west, and continues southward, back from the river, on the second, or prairie-terrace, some 1,400 or 1,500 feet. The greater number of the mounds forming the group are situated in the northern half of the territory covered, while only ten are on the south of this central line. The mounds are very irregularly dispersed over the territory included in the limits mentioned, and vary in size from fourteen to eighteen feet to forty-five or fifty in diameter, and are now from a foot and a half to five feet in height, though probably formerly much higher. Four of the mounds at the southern portion of the group were surrounded by a low ridge, now somewhat indistinct, but still in places about a foot in height. These ridges are composed of dirt, evidently scooped up from round the base of the mound, as between the ridge and the mound there is still a slight and even depression. The ridges about the two southernmost mounds (O, P) have openings nearly facing each other, while the one to the north of them (M) has the ridge broken on both

the eastern and western sides, and the one still farther to the north (L) has the ridge entire.

"In referring to this group of mounds I have called them mounds of habitation, and it seems as if that was most likely to have been their use. First, from the character of the surrounding country, which is level, and only some twenty-five or thirty feet above the present river, with every indication of a clear, damp soil in former times, though now the part not under cultivation is covered with a heavy growth of trees, several large trees even growing immediately on some of the mounds. What would be more natural to persons wishing to avail themselves of this terrace-prairie and proximity to the river, than to make a *mound* on which to erect their dwelling?

"Secondly, their great variation in size and irregularity in position, would indicate that a number of persons had got together for some common purpose, and each family, working with a common view to provide for certain ends, had erected a mound, varying in size according to the number at work upon it, or the degree of industry with which its makers worked during the time at their disposal.

"Thirdly, four of the mounds, marked K, M, N and O on the cut, were most carefully examined, to ascertain if they were places of burial, one of them (K) being opened by digging a trench through it some three or four feet in width, and to a depth of about one to two feet below the level of the surface on which the mound was built. The other three were opened from the top, by digging down in the centre until the original underlined surface was reached. None of these excavations brought a single bone, or an implement of any kind to light, but, on the contrary, showed that the mounds

had been made of various materials at hand, and in one case ashes were found which had probably been scraped up with other material and thrown upon the heap.

"Fourthly, the ridges surrounding four of the mounds may be the dirt thrown up to help support a palisade, or stake fence enclosing these particular mounds for some special purpose. The absence of human remains and all refuse in the shape of 'kitchen-heaps,' as well as implements, would seem to indicate that the place was not inhabited for any great length of time, and that it may have been simply a place of resort at special seasons, or for some particular purpose. That the mounds are of quite ancient date there can be no question; but beyond the fact that at least a second growth of trees has taken place on some of them, we have no data for indicating their age." *

Mr. John Collett, in his report of the Geological Survey of Sullivan County, in which Merom is situated, remarks, "Numerous earth-works are found in this region of such an extent as to require for their construction time and the persistent labor of many people. Situated on the river-bluffs, their location combines picturesque scenery, susceptibility for defence, and convenience to transportation, water, and productive lands. These are not requisites in the nomadic life of the Red men, and identify the Mound-builders as a partly civilized agricultural people.

"Over one hundred small mounds, from two to four feet high, may be seen about one mile northwest of Middletown. On the Hunt farm, conical knolls of Löess have been artificially rounded, and used for sepulchral purposes. On Mr. Drake's farm, are two large

* Putnam, "Proceedings Boston Society Natural History," Feb. 7, 1872, pp. 32-35.

mounds, one two hundred feet in diameter, and eighteen feet high; the other, twenty-eight feet high, and covering an elliptical base, one hundred and eighty feet wide, and three hundred and fifty feet long." *

Mounds occur near Covington and to the north of Attica; in fact, the whole valley of the Wabash must have been, in former times, the seat of a numerous population, forming as it did the great artery of communication between the Ohio River and the Lake Region to the north.

Passing over the low water-shed between the Wabash and the Kankakee, the mounds reappear in the valley of the latter stream. About twelve miles from Laporte, on the banks of a small tributary of the Kankakee, there are not less than twenty in number, some of which have been explored by Dr. Higday, with highly satisfactory results. He found that, at different times, the farmers of the vicinity had dug into four of them, and had taken out two copper hatchets, a piece of galena, two imperfect earthen vessels, and one skull, all of which he was enabled to secure. On further examination, he was enabled to recover the enamel of a human molar tooth and a pipe representing a female figure. "Selecting a tumulus ten feet high," he continues, "we sank a pit thirteen feet deep, where we struck the skeletons of two adults and one child. Near the heads we found an earthen vessel containing black mould, a pipe representing a bear (puma?), several large pieces of mica, a piece of galena, two copper needles (awls), a piece of plate-copper, and two rude copper hatchets. We next excavated two mounds each about six feet in height, but found nothing. The fourth one examined, originally, perhaps, about twenty feet in height, had been partially under-

* "Second Report on the Geology of Indiana," p. 237.

mined and washed away by the creek. We found under this, an adult skeleton, a copper needle (awl), several flint knives, and an earthen vessel filled with black mould and numerous pieces of tortoise shell. In the last one explored, which was over fifteen feet in height, a channel was cut down through the centre with teams and scrapers. A horizontal layer of ashes, two inches thick in the middle, and thinning out towards the circumference, was struck, thirteen feet from the top. Three feet below the ashes, we came upon a pipe, a copper needle, pieces of pottery, and two adult skeletons, one of which was nearly entire, lying upon what must have been a log of wood, but now so decayed that it could be readily pulverized by the hand. Only one small piece of shell was found, which proves to be the *Cardium magnum*, and which must have been brought from the Gulf of Mexico, as this species does not exist at a nearer point. The fact that both the earthen vessels were full of a black mould, and that one of them, also, contained numerous pieces of tortoise shell, may indicate that they were filled, when buried, with food for the departed." *

Ancient works of Northern Ohio and Western New York. —The region adjacent to Lake Erie, comprehending Northern Ohio and Western New York, contains ancient earthworks which differ somewhat from those of the Ohio Valley. There is the same combination of mound and enclosure, but with the ditch invariably on the *outside* of the parapets. Squier was disposed to regard these works as much more recent than those of the true Mound-builders, in fact, as belonging to the Iroquois. Colonel Whittlesey, however, claims for them as high an antiquity, but belonging to a different nation. He would classify the ancient works into three great divi-

* Communication to "The Chicago Academy of Sciences." 1870.

sions, and assign their construction to three distinct nations: 1, Those of the Ohio Valley, as the works of the *Agricultural Nation;* 2, Those of the Fort-builders on the Lakes, as those of the *Military Nation;* 3, Those between the Mississippi and Lake Michigan, as those of the *Effigy Nation.**

I hardly see the necessity for this assignment, for the Fort-building people penetrated to the Ohio River, as shown by some of the surveys given by Squier and Davis; and as I write, I have before me a recent letter from Professor E. B. Andrews, one of the Geologists of the Ohio Survey, in which he describes an earthwork recently discovered by him in Vinton County, in the southern part of the State, with the ditch *outside* the parapet. Recognizing these minor distinctions, it might be claimed that the earthworks of the Upper Mississippi were constructed by a different people, for the reason that all the mounds are destitute of enclosures; and that those of the Lower Mississippi were the work of still another people, because the truncated-pyramidal form predominates, and are rarely enclosed. In what may be called the frontier of the Mound-builders' empire, as I shall endeavor to show, it became necessary to fortify against sudden irruptions of the enemy, and hence the enclosures; but as we penetrate the heart of the empire, these structures disappear. If our country were to become a desolation, the future antiquary would find the sea-coast studded with fortifications of a complex form, and as he penetrated to the interior, they would disappear altogether. Hence, in tracing national affinities, the ethnologist should not hastily ascribe to different races, structures which show a very consider-

* "Ancient Fort-works of the Cuyahoga Valley," by Charles Whittlesey, p. 5.

able divergence in form, and which grew out of conditions, not applicable to the whole country.

Ancient works in New Mexico and Arizona.— The banks of the Colorado Chiquito, according to Mr. Leroux, as quoted by Lieutenant Whipple, are covered with the ruins of stone houses and regular fortifications, which appear to have been the work of civilized men, but which have not been occupied for centuries. They are built upon the most fertile tracts in the valley, where there are signs of *acequias* and of cultivation. The walls are of solid masonry, of rectangular form, some twenty to thirty paces in length, and yet remaining ten or fifteen feet in height. The buildings were of two stories, with small apertures or loop-holes, for defence when besieged. The style of building seems to be similar to the *chichitacle* or red house, above the Pimas, rather than like the Indian towns of New Mexico. The large stones of which they are built were often transported from a great distance.

At another place, he saw a well-built town and fortification, about eight or ten miles from the nearest water, and he inferred that the climate of the country, since their construction, had changed so as to convert springs and a fertile soil into a dry and barren waste.

Extensive traces of ancient ruins in this region have been observed and well represented in the report of Captain Sitgreaves. The Cosnino caves, according to this authority, had been plastered with mortar, showing more artistic skill than is practised by the present occupants of the country. At Pueblo Creek were found remains of towns and fortifications crowning the surrounding heights; and overlooking Aztec Pass are similar ruins. Westward, down Williams River to the Rio

Colorado, and thence to the Pacific, no vestiges of such ruins were seen.*

Lieutenant Whipple, in the report before referred to, describes many ruins of ancient workmanship, which fell under his own observation.†

At El Moro, on the top of a sandstone cliff, are the remains of an ancient pueblo, the walls of which still remain perfect to the height of six or eight feet — vertical, straight, and smooth. The masonry is well done, the stones being of uniform size, about fourteen inches in length, and six inches wide. The layers are horizontal, and each successive layer, with some appearance of regularity, breaks joints with that below. The beams, whose ends seem to have been mangled by a stone axe, rather than cut with a sharp instrument, are of cedar, and in excellent preservation. Arrow-heads of obsidian and colored pottery abound. "Old Zuni" he describes as presenting a mass of crumbling walls, from two to twelve feet high, and extending over several acres of ground. He found that the standing walls rested upon ruins of still greater antiquity, which must have been about six feet thick. These ruined cities are, no doubt, more recent than the mounds of the Mississippi Valley, and were built by the ancestors of the present occupants of the region.

The Pueblo Indians of New Mexico, who, it has been conjectured, may be a remnant of the ancient Aztecs, present in their habits strong contrasts to most of the other tribes. As described by Whipple, ‡ "they remain living in towns, irrigating and cultivating the soil, nearly

* "Pacific Railroad Reports," vol. iii., Art. "Indian Tribes," pp. 14 and 15.

† *Ibidem*, part i., pp. 63, 69.

‡ "Pacific Railroad Survey," vol. iii., Art. "Indian Tribes," p. 9 *et. seq.*

in the same manner as was their custom previous to the Spanish Conquest. . . . For the greater part of two centuries they have been characterized by peaceful dispositions, and noted for honesty and sobriety. . . . . Although most friendly in their intercourse with their white neighbors, they live exclusively by themselves, and neither intermarry with, nor adopt the habits of, any other race. They anticipate a return to them of the prosperity which their traditions commemorate as belonging to the Saturnalian or Montezuma Era." *

They claim to be descendants of the great Mexican emperor, who, born at Acoma, where their ancestors dwelt, became a leader and guide in their subsequent migration. He taught them to build pueblos with lofty houses and estufas, and to kindle sacred fires, to be guarded by priests. Acoma was strongly built and fortified, and Pecos was one of the principal towns. From the latter place Montezuma continued his march southward, founding pueblos far and wide, and finally established himself on the throne of Mexico.

Ancient works of the Atlantic Coast.—There are few authentic vestiges of the Mound-builders on the Atlantic sea-board. Some ancient structures are to be seen on the banks of the Wateree River, near Camden, South Carolina, consisting of circular walls enclosing a group of low mounds. These are described by Dr. William Blanding, in a letter to the late Dr. Morton, of Philadelphia. †

In the mountainous region of North Carolina, as I shall show elsewhere, were situated the great mica mines, yielding a mineral which entered largely into the

* As to the condition of the inhabitants of New Mexico, at the time of the Spanish Conquest, see Appendix D.

† Quoted in the "Ancient Monuments," etc., p. 105.

trappings of the Mound-builder. In this secluded region, secluded even at this day, with all our railroad facilities — for it can only be reached by a rough ride of two days on horseback, — we meet with the graves of this mysterious race, differing somewhat in their mode of construction from those at distant points. To Mr. Silas McDowell, a gentleman who has resided in this region (Franklin, Macon County) for more than half a century, I am indebted for the subjoined information.

Up to 1819 the Cherokees held possession of this region, when, in pursuance of a treaty, they vacated a portion of the lands lying in the valley of the Little Tennessee River. In 1821 Mr. McDowell commenced farming. During the first season's operations, the plough-share, in passing over a certain portion of a field, produced a hollow, rumbling sound, and, in exploring for the cause, the first object met with was a shallow layer of charcoal, beneath which was a slab of burnt clay, about seven feet in length and four feet broad, which in the attempt to remove, broke into several fragments. Nothing beneath this slab was found; but on examining its under side, to his great surprise, there was the mould of a naked human figure. Three of these burned clay sepulchres were thus raised and examined during the first year of his occupancy, since which time none have been found until recently. These fragments were so little appreciated that they were suffered to remain in the field, subject to the disintegrating agency of the elements and the tramping of cattle. During the past season (1872) the plough brought up another fragment of one of these moulds, revealing the impress of a plump human arm.

Colonel C. W. Jenkes, the superintendent of the corundum mines which have recently been opened in

that vicinity, advises me thus: "We have Indians all about us, with traditions extending back for five hundred years. In this time they have buried their dead under huge piles of stones. We have at one point the remains of six hundred warriors under one pile; but a grave has just been opened of the following construction: A pit was dug into which the corpse was placed, face upwards; then over it was moulded a covering of mortar, fitting the form and features. On this was built a hot fire, which formed an entire shield of pottery for the corpse. The breaking up of one such tomb gives a perfect cast of the form of the occupant."

Colonel Jenkes, fully impressed with the value of these archæological discoveries, detailed a man to superintend the exhumation, who proceeded to remove the earth from the mould, which he reached through a layer of charcoal, and then with a trowel, excavated beneath it. The clay was not thoroughly baked, and no impression of the corpse was left, except of the forehead and that portion of the limbs between the ankles and the knees, and even these portions of the mould crumbled. The body had been placed east and west, the head towards the east. "I had hoped," continues Mr. McDowell, "that the cast in the clay would be as perfect as one that I found fifty-one years ago, a fragment of which I presented to Colonel Jenkes, with the impression of a part of the arm on one side, and on the other of the fingers that had pressed down the soft clay upon the body interred beneath."

The Mound-builders of the Ohio Valley, as has been shown, often placed a layer of clay over the dead, but not in immediate contact, upon which they builded fires; and the evidences that cremation was often

resorted to in their disposition are too abundant to be gainsaid. The recovery of a perfect mould of a Mould-builder's form would be a matter of the highest scientific interest; as much so as of those Roman forms whose impress has been left on the volcanic ashes that settled down upon the ill-fated Pompeii nearly two thousand years ago.

No authentic works of the Mound-builders have been found in the other Atlantic States. There is a mound of considerable elevation in the valley of the Kennebec, in Maine, and traces of enclosures exist near Sanborn and Concord, New Hampshire, but their origin is involved in doubt.

Ancient works on the Pacific Coast.—It has been supposed that the Pacific Coast contained no pre-historic remains, but Wilkes, in his narrative of the Exploring Expedition, describes groups of mounds as occurring on the Bute Prairies of Oregon: "They are conical, thirty feet in diameter, about six or eight feet above the level, and many thousands in number." *

From a British Columbia newspaper of recent date, I quote the following: "There is a large mound, three hundred feet high and three hundred yards in diameter at the base, † at the southern end of the prairie, about twenty-five miles from Olympia, and scattered over the prairie for a distance of fifteen miles are many smaller mounds, not more than four feet high and twenty or thirty in diameter. Many conjectures have been made in the last twenty years as to what could have caused so singular a formation, but no one was ever curious enough until within the last few days to make any examination of the interior of these mounds. A few

* Vol. iv., p. 313.

† This is undoubtedly a natural eminence, artificially rounded.

days ago one of the engineers of the North Pacific Railroad opened one of them and found the remains of pottery; and a more thorough examination of others revealed other curious relics, evidently the work of human hands; in fact, in every mound that has yet been opened, there is some relic of a long-forgotten race discovered. The theory now is that this prairie was the cemetery of the people who inhabited the country in pre-historic times."

To a mere mound, or group of mounds, little importance is to be attached in tracing national affinities, for, as will be shown, this is the rudest form by which a people seek to perpetuate the memory of a signal event, or commemorate the death of a hero; and hence they are common to all ages and all nations. If these mounds were connected with those elaborately-constructed enclosures, or exhibited the form of the truncated pyramid, which I have described as occurring east of the great water-shed of the continent, they might be cited as an evidence of a common origin on the part of the builders.

Ancient works in the Montanic Region.—"The Denver News," not long ago, stated that a mound had been discovered in Southern Utah, which, on excavation, yielded relics showing much artistic skill; and in a later issue further stated, that, on the extreme summit of the Snowy Range, were found large granite blocks in an upright position, conforming to the general outline of the ridge. These are in the nature of "dolmens," a class of structures rarely seen in the United States.

"About half a mile west of Golden City, Colorado," according to Mr. E. L. Berthoud, "are ruins formed of an old broken-down circumvallating circle of rough

stone, derived from the neighboring mountains and a sandstone ridge south of them. These ruins are at the junction of a ravine ten feet in depth, and the bed of Clear Creek, which is about twenty feet vertically below the walls. A large amount of stone has been taken for foundation walls, but enough remains to give an outline of its position and shape. The stones are, in many cases, embedded in the soil, and are mossy with age. On the south side is a pit twelve feet wide, and about fifteen to eighteen inches deep, shaped like a saucer. The central mound, very plainly discernible, nowhere over one foot high, is formed of granitic sand, and around its circumference are evidences of five or six shallow pits, surrounded by a stone enclosure, now almost gone, and traced by broken fragments of stone, burnt bone, etc." *

Mr. A. Barrandt states that archæological remains occur on the Upper Missouri, between the mouth of the Yellowstone and at intervals, as far down as Bonhomme Island, below Fort Randall.

"Among the most important and well-preserved, is one existing about nine miles southeast of the Missouri, and within half a mile of Clark's Creek, in Dakota. The main work is in the form of a parallelogram, three hundred and forty feet long, one hundred and ninety feet wide, and twenty and twenty-five feet high. The walls on an average, are seven feet thick on the summit. There are two openings, one facing west twenty-four feet, and the other facing south, only nine feet wide. The space inside was full of cotton-wood and ash trees. Several large blocks of sandstone, roughly hewn, were found, but the walls, and a ruined portion of what appeared to be the remains of a smaller enclosure, were

* "Smithsonian Report." 1866.

of calcined clay, changed by burning, into a brick color. . . .

"About two hundred and fifty miles up the Bighorn River, we found, also, another mass of ruins, where was, probably, the site of a large mound city, but none are now existing; they have all crumbled away, and from a large oak that we felled, I found that they must have occupied this spot at least six hundred years ago, as the tree grew on the remains of what was probably the largest mound. . . .

"Further up the Yellowstone, I found the remains of an ancient City of Mounds, which seems to have been regularly laid out: the streets are regular and the mounds are equidistant from one another."

He found the largest one sixty-three feet in diameter at the summit, and twenty-seven feet high. From the smaller ones, he gathered fragments of sun-dried pottery, arrow-heads, etc. Eighty-seven mounds were in a state of preservation, and sixty-three in ruins.

On the banks of the Moreau River, a few miles from its mouth, he discovered another Mound City containing about two hundred mounds. Two and one-half miles to the north, there was another group of the largest mounds he had ever seen. Another group he observed on the banks of the Great Cheyenne.*

The remains of fortifications described by Lewis and Clark, in the Journal of their Expedition up the Missouri, in 1804-5-6, occur on Bonhomme Island.

Whether the pre-historic races who threw up the structures on the Pacific Coast and in the Montanic Region, were identical with the Mound-builders, is a matter of uncertainty. Future explorations, aided by a careful comparison of relics, may solve the question.

* "Smithsonian Report." 1870.

Garden-beds in the Northwest.—In portions of the region bordering Lake Michigan, particularly in Lower Wisconsin; in the valleys of Grand River and St. Joseph's, Michigan; and in Northern Indiana; occur a series of ancient works, first pointed out by Schoolcraft,* which are different from any hitherto described, and known as garden-beds. Many of the lines of the plats are rectangular and parallel; others are semicircular and variously curved, forming avenues, differently grouped and disposed. Dr. Lapham describes those of Wisconsin as consisting of low parallel ridges, as if corn had been planted in drills. They average four feet in width, and twenty-five of them have been counted in the space of one hundred feet. The depth of the walk between them is about six inches. He also draws the inference that these "garden-beds" were not constructed until after the mounds, as they sometimes extend across them in the same manner as over the adjoining grounds.†

Mr. Canfield states that these garden-beds, in Sauk County, occupy fields of from ten to one hundred acres, and have different directions, as though each family had had a separate patch for cultivation.‡

They certainly indicate a methodical cultivation which was not practised by the Red man, but perhaps it is going too far to infer that they were constructed by a different race from the Mound-builders, for the reason only that they often extend over mounds which the builders are supposed to have regarded as sacred, and that such cultivation would have been a desecration.

* "Condition and Prospects of the Indian Tribes," etc., vol. i, p. 55.

† "Antiquities," etc., p. 10.

‡ "Sketches of Sauk County, Wisconsin."

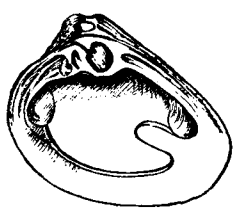
CHAPTER IV.

SHELL-BANKS — THEIR GEOGRAPHICAL DISTRIBUTION.

THERE is another class of accumulations of human origin, existing in many parts of the country, some of which have claims to a very considerable antiquity, while others are comparatively recent. These are known as shell-banks, and the materials are both of marine and fresh-water origin.

Marine accumulations.— The most remarkable of these accumulations occur on the Gulf Coast, and consist, for the most part, of the *Gnathodon cuneatus*.

FIG. 11.



Gnathodon cuneatus.

The habitat of this shell is in brackish water, and it buries itself in the mud-banks where the tide ebbs and flows every twelve hours. No one, except from observation, can form a just idea of the magnitude of these accumulations. Mobile is built upon beds of them; the famous "shell-road" out of New Orleans to Lake Pontchartrain, is Macadamized with them; and a lucrative traffic is driven in exporting them to distant parts for garden-walks and other ornamental purposes.

Professor Forshey has in his MS. notes furnished me

with very exact descriptions of the shell-heaps in the region of New Orleans.

"Descending the Mississippi, we find the Gulf Coast lined with an infinite number of bayous, lakes, and lagoons, with Gnathodon shells, and occasionally with some muscles, piled up in reefs or ridges along their banks. Most of these accumulations are artificial, though many are apparently natural. They may be distinguished, in this respect, by the presence or absence of pottery, flint-flakes, and occasionally pipes, stone mullers, and hatchets.

"These ridges and occasional mounds are very numerous near the city of New Orleans and along Lakes Pontchartrain and Maurepas, and the small bayous that pass from one into the other, and from the river to these lakes. At about fifteen miles above the city, measured by the river, was a very small bayou, called Metaire—an outlet prior to the levees,—which passed in the rear of the city midway to Lake Pontchartrain. A ridge of land some seven feet higher than the swamp-level, skirted the bayou on either side some thousand feet wide. The bayou kept its course with a depth anterior to the levees of some six feet. In the middle of the old city, this ridge seems to have been traversed by Bayou St. John, which started within half a mile of the river, and by aid of some violent crevasse, broke through the Metaire Ridges and Bayou, and created a deep channel into Lake Pontchartrain, at a point six miles from the river. This is the channel through which the city has long been drained into the lake. The Bayou Metaire here loses its name and is called Gentilly below the Bayou St. John, and passes on southeasterly, its channel discharging into Lake Bourge.

"Shell-mounds and shell accumulations abound along

the Metaire, the Gentilly, and the lake-shores, but none along the Mississippi. One shell-heap occurs in the rear of Carrolton, and on the rear slope of Metaire Ridge, several hundred feet in extent, though somewhat angular. The accumulation is about seven feet high, and is covered with trees which apparently are of the same age as those of the swamp it lies in. Broken pottery of clay and pulverized shells were found upon it.

"On the right bank of the river, nearly opposite New Orleans, rises up the Bayou Barataria, which drains the lakes between the Mississippi and La Fourche, passing into the Gulf at Barataria Bay, famous as the rendezvous of the pirate Lafitte. Along the banks of this bayou are vast shell accumulations, which, for years, like the others I have named, have been used for street grading and garden-walks in New Orleans. A constant trade in small sail-boats and barges is kept up, and this trade is fast exhausting these supplies.

"On this bayou, as elsewhere off the sea and lake-shores, all these accumulations are artificial. The prehistoric inhabitants doubtless lived upon these shell-fish, either in great numbers, or through many centuries of time; yet they are found in the banks, like oysters elsewhere, as if placed where we find them, by natural causes.

"At the junction of this bayou with Bayou Perrot, near Lake Larto, is a very large mound, perhaps 600 feet in length, and 200 feet in width, and some nine feet in height, made up of a mass of shells. There were formerly other banks, I believe, which showed artificial construction, but they have been mutilated for gain, just as this 'Little Temple' is now being destroyed —many thousands of cubic yards of these shells being annually brought to the city.

"The 'Little Temple,' is so called to distinguish it from the 'Grand Temple,' near the mouth of Bayou Des Allimans, on Lake Pallourde. An island is called 'Temple I,' from this greatest of all shell-mounds, it being much larger and higher than that on the Barataria.

"Some fifteen miles further south on the Chinese Bayou, there are several mounds of a like character, and of considerable magnitude.

"Another and larger than either of these stood on the west side of Berwick's Bay, just above and opposite Brashear. It was built of shells and loam, and was some twenty feet high, and more than two hundred feet square, but was destroyed in 1863, because the Confederates used it for cover. This is the lowest and farthest west of all the artificial mounds I have seen, although others may exist. Shell-mounds abound at Pointe la Hache, forty miles below New Orleans. The church and cemetery at that point stand upon them."

West of the Mississippi these shell-heaps are continued. At Grand Lake, on the Teche, as I am informed by Mr. George C. Walker, the accumulations reach from six to ten feet in height, forty feet in breadth, and extend in length three-fourths of a mile, and large live-oaks are seen growing upon them. This region is now fifteen miles inland, thus showing that marked changes in the sea-level have occurred in comparatively recent times. These shell-mounds have yielded unique specimens of axes of hæmatatic iron ore and glazed pottery, transferred by the kindness of Dr. Dungan to the Chicago Academy of Sciences, but unfortunately destroyed in the memorable fire.

The same class of accumulations, according to Nott

and Gliddon, occurs on the Alabama River, fifty miles inland, and the evidence is irresistible that the aborigines collected these molluscs for food when Mobile Bay occupied that region. "The shells," say they, "have all been opened, and we find in them the marks of fire extending over considerable spaces; the shells converted into quicklime are mingled with charcoal, so that the successive accumulations of shells may be plainly traced. Fish-bones and other remains of Indian feasts, are common; also fragments of Indian pottery and of human bones, that can be identified by their crania. Some of these beds are covered over with a vegetable mould from one to two feet thick, which must have been a very long time forming; and upon this are growing the largest forest trees, beneath whose roots these Indian remains are often discovered." *

Sir Charles Lyell has described a shell-bank on St. Simon's Island, near the mouth of the Altamaha River, Georgia, covering ten acres, with a depth of from five to ten feet.†

Dr. Brinton has described similar accumulations in Florida. At Fernandina, on Amelia Island, a layer of shells exists along the bluff for one hundred and fifty yards, extending inland for a quarter of a mile. In parts the deposit is three feet in depth, composed almost entirely of oyster shells, with a few shells of clams and conchs. Similar deposits occur on both sides of the entrance to the St. John's River, and on Anastasia Island. Near Smyrna is seen Turtle Mound, which is almost entirely a mass of oyster shells, thirty feet thick. Another very similar shell-mound occurs opposite Smyrna; and on Crystal River, four miles from

* "Types of Mankind," p. 272.

† "Second Visit to United States," vol. i., p. 252.

its mouth, there is a mass of shells, forty feet thick and thirty broad, with a nearly level surface.*

Professor Vanuxem was the first in the United States to call attention to the artificial origin of many of these banks. As far back as 1841 he described the large accumulations of oyster shells (*Ostrea virginica*) which occur on many parts of the Atlantic coast, and particularly on the waters of the Chesapeake. Some of the deposits are described by him as enormous, covering acres of ground. After much doubt he was disposed to refer some of them, at least, to human origin, for the reasons that those employed in collecting them were unable to find any two valves which fitted each other, and that in the progress of the investigation, arrow-heads and fragments of pottery were disclosed; and, besides, the deposits reposed on a yellowish loam — the surface-soil of the region, — which was penetrated by the roots of the red cedar.†

Mr. J. M. Jones, President of the Institute of Natural Science of Nova Scotia, describes shell accumulations (intermingled with flint implements, charcoal and the bones of existing birds and animals) similar to those found on the coast of Denmark.

They occur at St. Margaret's Bay, about twenty-two miles southwest of Halifax, on a knoll some twenty feet above the water, and are fifty yards or more in length, and eight yards in breadth. When the soil, which covers the mass to the depth of a few inches, is removed, there is found a layer of compact shells, such as the quahog, clam, scallop, etc., perfect and imperfect, in which lie the bones of animals, such as the moose, bear, beaver, and porcupine; and of birds, some of

* "Notes on the Floridian Peninsula."

† "Proceedings American Association of Geologists," vol. i., p. 22.

them belonging to a form larger than the great northern diver; and fish vertebræ, like those of the Norway haddock; together with flint and quartz arrow-heads, and broken pieces of rough pottery, bearing evident traces of attempts at ornament. In this connection were found bones sharpened into awls. Granite boulders are scattered in heaps, which served as ancient seats, for, when dug about, greater masses of shells and more evident traces of fire were observed. The charcoal, in some instances, had lost but little of its consistency.*

Professor Wyman has described the shell-banks occurring at Frenchman's Bay and Crouch's Cove, in the State of Maine, consisting of the quahog, scollop, muscle, periwinkle, etc., with remains of charcoal, but without the association of stone implements. He also describes similar accumulations as occurring at Ipswich, Salisbury, and Cotrick Point, in Massachusetts. At the first-named point, a human under-jaw has since been obtained by Professor Baird.

From his survey of these deposits, he arrives at the conclusion that they yield nothing which indicates as high an antiquity as the kitchen middings of the Old World.

These deposits contain the remains of the elk, which has now retired beyond the Alleghanies, and the wild turkey, now virtually extinct in New England, and of the great auk, which has probably receded to the Arctic Circle, or become extinct.†

While thus the shell-heaps of New England may be comparatively modern, those of the Gulf Coast have a comparatively high antiquity, going back to the

* "London Athenæum."

† "American Naturalist" Feb. No., 1868.

Mound-builder Era and possibly beyond, for the region has undergone marked physical changes since they were accumulated.

On the Pacific Coast.—Shell-banks exist in vast numbers on the Pacific Coast. A newspaper correspondent * describes those which occur near San Francisco:

"San Pablo is about fifteen miles from Oakland, and lies almost due north. Within three miles of the town a shell-mound rises up from the plain to almost the dignity of a hill, which is now covered with a growth of shrubbery. The mound is almost a mile long and half a mile wide. Fragments of pottery made of red earth, not to be obtained anywhere in this State, are found on the surface and near the top. About two years ago Mr. McHenry, the owner of the land, dug a trench, and at a depth of twenty feet, sixty feet in from the west, near the base, found numerous skeletons of Indians of all sizes, and some bones of dogs and birds, and many implements of stone. One baby had been rolled in a long piece of red silk, like the mummies, which had been covered with a coating of a sort of asphaltum. Mr. McHenry also found in other parts of the hill evidences enough to show that this mound was a burying place for some extinct tribe of Indians, as the skulls are different from all others known, in some particulars. All the skeletons were in a sitting posture, with their faces turned northward. The shells that form this mound are the oyster, clam, and muscle; all having been exposed to the action of fire, and nearly all are broken. Very rarely are entire shells found. The same kind of mounds, though not so large, are found near San Mateo, on the San Francisco side. They are all near the shores of the bay, and have been made of shells of oysters

* "St. Louis Globe."

and muscles that the Indians used as food, and which they evidently roasted to open."

The corpse "rolled in a long piece of silk," instead of being marvellous, would indicate that this was an intrusive burial made since this region was known to the whites. The presence of the bones of dogs, too, would confirm this supposition.

Fresh-water shell-heaps.— These occur in large banks, at many points along the principal streams of the Mississippi Valley, and under conditions which would refer their origin to human agency. They consist of the common Unios and Anodons, now inhabiting those streams, which were undoubtedly gathered for human food, for it is difficult to find the corresponding valves. Intermixed with the mass are often found fragments of pottery, stone implements, remains of charcoal, etc. Banks of this kind occur in the American Bottom in Illinois, in close proximity to the mounds.

Similar banks have been observed by Professor Cox, at numerous points in Indiana. At New Harmony, or rather about a mile and one-half south of that village, one is to be seen, whose artificial origin was determined by those eminent naturalists, C. A. Lesueur and Thomas Say, as far back as 1826, mention of which is made in the magnificent work "Travels in the United States," by the Prince Maximilian. This is, probably, the earliest notice of the existence of such artificial accumulations to be found in our Natural History literature. The locality was, at a later date, visited by Sir Charles Lyell, and is described in the volume known as his "Second Visit to the United States."

This bank consists, for the most part of Unios, belonging to those species which may be described as gregarious and reef-building, among which are the *U.*

plicatus, *U. pyramidalis*, *U. ebenus*, *U. crassus*, and *U. tuberculatus*. Associated with them are univalves such as *Paludina ponderosa*, and a few *Melanias*. Intermixed with these are found the bones of animals indigenous to the country, belonging, for the most part, to small quadrupeds, together with fragments of charcoal.

The position of this bank is on one of the highest hills in the region, one hundred and seventy feet above the "Cut-off," an arm of the Wabash River, and the area occupied is about one-fourth of an acre. The ridge, which terminates near the Cut-off, is very narrow, has a very precipitous descent, and is marked by a series of spurs. These positions were selected by the Mound-builders for burial places, and are indicated by low mounds. When explored, the graves, as first determined by Lesueur, are found to be encased with flags of sandstone, within which the corpse was placed. The geological formation consists of Löess, fifteen feet thick, resting on a layer of Drift-accumulated pebbles.

In Perry County, Indiana, according to the authority above quoted, about three-fourths of a mile above Rome, on the second bottom of the Ohio River, is an artificial shell-heap which has been so repeatedly ploughed over as to render it impossible to compute its original dimensions. Great quantities of stone implements, such as arrow-heads, axes, bark-peelers, etc., have been picked up.

At Aydelotte, just below New Albany, in an old orchard, there is a shell-bank which has yielded a large assortment of implements both of stone and bone, most of which are preserved in the museum of the New Albany Natural History Society. Of the former may be enumerated axes and ornaments; and of the latter, fish-hooks, knives, awls, and needles.

In Martin County, there is a shell-bank on the top of a hill one hundred and fifty feet high, overlooking the east fork of White River, and just below the town of Shoales; and another in which are found intermingled ashes, charcoal, bones of quadrupeds, birds, and fishes, bone needles, bone fish-hooks, etc.*

Another shell-heap is mentioned in Professor Cox's MS. notes as occurring near Edwardsport, on a hill-side, thirty feet above the road-bed, which he has been unable to explore.

Shell-banks are also found on the Tennessee River, between Chattanooga and Muscle Shoals. Mr. J. Parish Stelle has examined two deposits occurring near Savannah, on both sides of that stream. That on the eastern side covers half an acre of ground, and is eighteen inches in thickness; that on the west side occupies a somewhat smaller area, is two feet thick, and lies about three feet below the surface; that is, the river has made a sedimentary deposit on the shell-heap three feet deep. There is now growing upon it a burr-oak fully six feet in diameter. Extensive earth-works—mounds and enclosures—exist in the vicinity. Broken pottery was found in great abundance with the shells and other refuse. Evidences of former fires were seen on a level with the bottom of the shell-bed. The earth was burned hard and red, and at one point he observed stones arranged as if to support cooking utensils.†

On the banks of the Yazoo River, Mississippi, according to Humphreys and Abbot,‡ many shell-mounds are to be seen. They are above overflow, and are composed of the shells of fresh-water muscles, such as are now

* "Referred to in the "Second Indiana Report," p. 111.

† "Smithsonian Report," 1870.

‡ "Physics and Hydraulics of the Mississippi," p. 89.

found in the river. No traditions relative to their origin are preserved among the Indian tribes of the present day.

The fresh-water shell-heaps of Florida, which have been explored by Dr. Wyman, are on a scale of magnitude which almost surpasses belief. They are distributed over an area of more than one hundred and fifty miles, between Palatka and Salt Lake, and nearly all are restricted to knolls. Among the forms most common, are *Ampullaria depressa*, *Paludina multilineata*, and *Unio Buckleyi*. In size the mounds vary from circular heaps, fifteen or twenty feet in diameter, to long ridges several hundred feet in length, and from four to five, and in some instances, fifteen feet thick. The shell-mound at King Philip's Town is about four hundred and fifty feet long and from one hundred to one hundred and twenty feet broad, and at its greatest thickness is about eight feet. Fragments of pottery and broken animal bones were found intermingled. At Black Hammock, on the St. John's River, a mound occurs which is about nine hundred feet long and varies in breadth from one hundred to one hundred and fifty feet.

The following are the principal objects obtained by Dr. Wyman which indicated the agency of man in their accumulation: Marine shells, such as the *Strombus gigas*, *Pyrula carica*, and *P. perversa*, with the inner whorls removed. These shells were manufactured into gouges, chisels, and hatchets. Stone implements are rare. A chisel and twenty-five arrow and spear-heads were collected near, but not in the mounds themselves. The animal remains include the bear, deer, raccoon, opossum, terrapin, turtle, alligator, cat-fish and garpike. Bones of birds are rare.*

* "American Naturalist," vol. ii, Nos. 8 and 9.

In reference to the immense accumulations of these two small convoluted shells, the *Ampullarias* and *Paludinas*, Professor Wyman, in a subsequent report,* remarks: "It seems incredible to one who searches the waters of St. John's and its lakes at the present time, that the two small species of shells above-mentioned, could have been obtained in such vast quantities as are seen brought together in these mounds, unless at the times of their formation the shells existed more abundantly than now, or the collection of them extended through very long periods of time. When it is borne in mind that the shell-heaps afford the only suitable surface for dwellings, being mostly built up in swamps, or on land liable to be annually overflowed by the rise of the river, they appear to be necessarily the result of the labors of a few living on a limited area at any one time. At the present it would be a very difficult matter to bring together in a single day enough of these shells for the daily meals of an ordinary family. That they formerly existed in larger numbers than now is by no means improbable."

Professor Wyman proceeds to cite numerous examples within the Human Epoch, in which both animals and plants, after flourishing for considerable periods within given areas, have been compelled to yield in their struggle for existence, against changed conditions.

With reference to the age of these mounds, he states that there is to be seen near Silver Spring, where exists a shell-heap which is reported to cover nearly twenty acres, a grove of live oaks, a few survivors of a race of giants once common in the forests near the river. "Six of these, at five feet from the ground, measured as follows: One, thirteen feet; three, fifteen feet; one, nine-

* "Fifth Annual Report Peabody Museum," etc.

teen; and one between twenty-six and twenty-seven feet in circumference. This last had been destroyed by fire — an act of vandalism committed for the purpose of collecting the moss hanging from its branches. . . . These trees are not on the highest part of the mound, but on the slope furthest from the water. Excavations made beneath the largest of them showed that the tree was of more recent origin than the mound itself. If at the beginning of the second century of the life of the live oak, there are twelve rings at least to the inch, then the above-mentioned tree, having a semi-diameter of fifty inches, would have an age of not less than six hundred years, and was near the second century of its existence at the time of the landing of Columbus. On the same basis of calculation, the least age of the mounds near Blue Spring, and at Old Town, would be about four hundred years. Though these estimates are to be regarded only as approximations to the truth, they, without doubt, carry back the origin of the mounds beyond the reach of history or tradition, and certainly one or two centuries before the discovery of America. Although they cannot be more recent than the trees growing upon them, they may have been and probably were, finished long before the life of the trees above-mentioned began."

The crania from the shell-heaps of Florida, according to those obtained by Professor Wyman from a small sand-mound a few miles from Cedar Keys, have peculiarities which distinguish them from those of the Mound-builders. The capacity of the skulls is greater, being 1375 cubic centimetres, or nearly eighty-four cubic inches; they show no signs of distortion; they are remarkable for massiveness and thickness, the average thickness through the parietal bones in eight of them

being 10.5 millimetres or 0.42 inch, which is almost double the usual thickness; and all are quite heavy, the heaviest of the series weighing 995 grams; and notwithstanding the loss of its organic matter, is heavier than any of the three hundred skulls in the collection, the next heaviest being those of the Negro, weighing 975 grams, of a Hawaiian Islander, weighing 845 grams, and of a Tsuktshi, weighing 860 grams.*

* "Fourth Annual Report," etc., p. 13.

CHAPTER V.

MOUNDS AND ENCLOSURES.

THE Mound-builders, in selecting sites for their structures, appear to have been influenced by the same motives which governed their successors of European descent. Timothy Flint long ago called attention to the fact that nearly every considerable town in the Ohio, and he might have added in the Mississippi Valley, is founded on the ruins of pre-existing structures. Cincinnati, St. Louis, Chicago, Milwaukee, all are thus founded, and the list might be enlarged to an almost indefinite extent. The river-terraces and bottoms were, for the most part, selected, and for obvious reasons. In the first settlement of a continent, rivers are the great highways; in fact, until after the lapse of a considerable period, they afford almost the only means of communication between widely-separated points. The history of Anglo-Saxon civilization on this continent shows how great a task it has been, even with the aid of iron and steel, and of those animals which are the allies of man, to subdue the primeval forest; and yet how much greater the task to a people who could only resort to stone and copper axes, and the additional aid of fire.

The river-valleys abound in game, fish, and spontaneous fruits and nuts. Every hunter knows that the deep recesses of the forest are shunned by mammals and birds, and every one who has plunged into those

recesses must at times have been oppressed by the stillness which reigns throughout. In the valleys the vegetable-eaters find their best feeding-grounds, and the carnivorous animals, both mammals and birds, naturally follow in their track. The valleys, too, let in the sunlight, which is essential to the development of both animal and vegetable organisms.

In selecting, therefore, the river-terraces and bottoms as the sites for their structures, they but availed themselves of the natural advantages of the country, ready access to living water, natural highways, a variety of wild fruits and nuts, streams stocked with fish and natural parks with game, and, above all, a warm and quickening soil, easily tilled, in which to plant their great agricultural staple — maize. They had in view, too, the picturesque, for many of their mounds are reared on the highest bluffs, from which the eye ranges over a sweep of country diversified by wooded steeps and rolling prairies, with a broad river winding its way through the landscape, whose course can be traced until it mingles with the horizon.

In view of the beauty and fertility of their empire, the Mound-builders might appropriate to themselves the words of the Great Spirit, as recorded in the legend of Hiawatha:

> "I have given you lands to hunt in,
> I have given you streams to fish in,
> I have given you bear and bison,
> I have given you elk and antelope,*
> I have given you brant and beaver,
> Filled the marshes full of wild-fowl,
> Filled the river full of fishes."

Squier and Davis hastily stated that none of these works occupied the alluvial bottoms (an error which

*I trust that our great poet will pardon me for having substituted the words "elk and antelope" in the place of "roe and reindeer." The

Mr. Squier subsequently corrected), and from this statement the most erroneous conclusions as to their antiquity have been drawn. There is nothing to indicate but that these works were constructed after the surface had assumed its present configuration, and that the climate had become essentially as it is now. That they should not occur as abundantly on the bottoms as on the terraces, is not to be wondered at, when we consider the great fluctuations of the Mississippi and its tributaries. The extreme range between low and high-water of the Upper Mississippi, at its mouth, is thirty-five feet; that of the Missouri, at its mouth, about the same; and that of the Ohio, at Louisville, forty-two feet. Hence, during flood-time, a greater portion of the bottom-lands are subject to overflow, and it would be but natural for the Mound-builders to shun such situations. Where the immediate valleys lie above high-water, we find their works. Of this the "American Bottom" is a notable instance.

Whilst mounds and enclosures constitute but parts of one system, Squier and Davis have seen proper to classify them in reference to their purposes, under the following heads:

I. ENCLOSURES. { *For Defence.* / *Sacred.* / *Miscellaneous.*

II. MOUNDS. { *Of Sacrifice.* / *For Temple-sites.* / *Of Sepulture.* / *Of Observation.*

term "roe" is not applied to any species of our *Cervidæ*, and the dominion of the Indians only extends to the confines of the reindeer's range. On the other hand the elk and antelope are two forms of quadrupedal animals, highly characteristic of our Western Plains.

Enclosures.—There can be little doubt that such works as those near Bourneville, Hamilton, and Granville, and those on the banks of both the Miamis, in Ohio; on the bluffs of the Saline River in Illinois; on the mountain summits of Northern Georgia; and at other points, were erected for purely defensive purposes, and were selected in reference to military considerations. They are almost natural fortresses, which could only be approached by an enemy uncovering his front to the full force of such missiles as the besieged might employ. The parapets are often constructed of stone, not laid in regular courses, but heaped together in the form of rubble; and these blocks of stone may have been among the available weapons to repel an assault by rolling them down the declivity, which in many instances is so steep that they would descend by their own momentum. It is to be observed that in most of these works, which are regarded as purely defensive, the ditch is on the *inside*; and were it otherwise, it would have seriously interfered with the mode of defence which I have suggested.

Those works in Northern Ohio and Western New York, which exhibit the trenches on the *outside* of the parapets, are also classed as defensive, while those which occupy level plateaux in the valley of the Ohio, with the trench *inside*, which are by far the most numerous, are classed as sacred enclosures. I do not recognize the importance of this distinction. Many writers, who have speculated upon this feature, seem to have adopted the idea that the enemy, whoever he may have been, settled down before these works, as the Greeks did under the walls of Troy, and engaged in a protracted siege. Now every one acquainted with Indian warfare knows that it consists in surprises. A

blow is struck, a massacre ensues, and a retreat follows. Savages have not the means of subduing a fortification by regular approaches, nor the accumulated provisions to sustain them while awaiting the result. A company of infantry on the Plains, protected by an enclosure of palisades — trunks of trees set upright and sharpened to a point, — may defy the combined power of the Indians indefinitely, or until their supplies give out. The Mound-builders, if their enemy were like modern Indians, had only to guard against sudden attacks, and a row of pickets, without reference to whether the trench were inside or outside, would be effectual. Catlin has shown that the Mandans, in fortifying their villages, constructed the ditch inside, the warriors using the embankment as a shelter while they shot their arrows through the interstices of the pickets.

These enclosures are the most conspicuous along what may be called the frontier of the Alleghanies, and disappear altogether as we enter the immediate valley of the Mississippi, which contains the most stupendous of the mounds. This would seem to imply that there was another race, occupying the mountain region to the east, and perhaps the Atlantic coast — a race of Highlanders, essentially different in habits, for they have left no permanent structures — who from time to time, made predatory excursions into the Mound-builders' country, and succeeded at last in extirpating the inhabitants. On the west, it may be inferred, the country was secure against such irruptions. A great line of defence, I think, is traceable all the way from Western New York to the Ohio River, and even beyond.

Upon this head, Squier and Davis remark: "There seems to have existed a system of defences extending

from the sources of the Alleghany and Susquehanna, in New York, diagonally across the country, through Central and Northern Ohio, to the Wabash. Within this range, the works which are regarded as defensive are largest and most numerous. If an inference may be drawn from this fact, it is that the presence of hostilities was from the northeast; or that if the tide of migration flowed from the south, it received its final check upon this line. On the other hypothesis, that in this region originated semi-civilization, which subsequently spread southward, until it attained its height in Mexico, we may suppose that from this direction came the hostile savage hordes, before whose incessant attacks the less warlike Mound-builders gradually receded, or beneath whose exterminating cruelty those who occupied this frontier entirely disappeared, leaving these monuments alone to attest their existence, and the extraordinary skill with which they defended their altars and their homes. Upon either assumption, it is clear that the contest was a protracted one, and that the race of the mounds were, for a long period, constantly exposed to attacks.*

The foundations of the stockades which are maintained at this time at many points on the Plains, a century hence, will be less conspicuous than almost the obscurest of these enclosures. I can imagine other purposes, to which they were applied. The large ones may have been walls, surrounding their towns and cultivated fields, and used even to protect their crops from predatory animals. The smaller ones may have been designed to guard their temples and sepulchral mounds from profane intrusion. Every nation has its games, and the ruder the nation is, the greater the

* "Ancient Monuments," p. 44.

attempt at barbaric pomp and magnificence. There can be little doubt that the Mound-builders had their national games which were celebrated within these enclosures. They had, too, their religious observances, their funeral ceremonies, and their grand councils; but no clear line, I think, can be drawn in reference to the different purposes of these structures.

Altar or sacrifice mounds.—"The general characteristics of this class of mounds," as pointed out by Squier and Davis, "are: 1. That they occur only within the vicinity of the enclosures or sacred places; 2. That they are stratified; 3. That they contain symmetrical altars of burned clay or stone, on which were deposited various remains, which in all cases have been more or less subjected to the action of fire."*

This class of mounds, which occurs in the Scioto Valley, may be said to be unique, not so much in any one feature, but in the combination of features. The sacred enclosure, as we have seen, is not recognized in the "American Bottom," where the mound-system is so magnificently developed. In the "Battle-mound" at Vincennes, the stratified structure was recognized, arching over a large number of bodies, but the enclosure was absent. Whilst the evidences of fire, sufficiently long-continued to change the natural color of clay to a brick-red, and even to convert it into a burial-case, as seen in the graves of North Carolina, are in a great number of instances recognized, yet, it may be said, that the explorations made in other fields have not revealed the existence of symmetrical altars. The numerous sections given by our authors show a dish-like nucleus of clay which served as a hearth, upon which a fire was built, offerings were made, and other

* "Ancient Monuments," etc., p. 143.

ceremonies performed, when a mound was heaped up, composed of alternate layers of sand and earth, not horizontal, but conforming to the convexity of the structure. In the mound near Middletown, Butler County, Ohio, sixteen feet in height, which will be particularly described hereafter, the following structure was observed: About ten feet from the top, there was a firm, compact stratum of fine clay, an inch thick, which appeared to have been burned until it was red. Under this, midway in the mound, was another stratum of cream-colored clay, different from any material in the vicinity; beneath this was a mass of charcoal, cloth perfectly carbonized as though first ignited and then smothered, and charred bones. The charcoal was outside the cloth. It is to be regretted that the explorations were not continued sufficiently far to determine the nature of the hearth on which the fire was kindled. The strata of burnt and yellow clay did not extend through the whole mound, but occupied an area of only five or six feet in diameter.

In this mound we recognize an internal arrangement somewhat analogous to that in the Scioto mounds, which are regarded as sacrificial, and we can trace the successive stages in its construction. Upon a hearth of clay, probably, corresponding with the altar, was built a funeral pyre, upon which the body, invested with cloth, was placed and the fire lighted. This is the inference from the charred bones and the rim of charcoal outside the matted folds of cloth. Whether this ceremony was designed simply to reduce the corpse to ashes, or whether it was the offering up of a living victim, cannot be clearly determined. While the embers were yet glowing and before even the cloth was consumed, the fire was extinguished by covering it

with a layer of cream-colored clay, which, to the modern explorer, showed no marks of fire. The mound was then heaped up with earth, when another layer of clay was added, upon which a fire was built and continued sufficiently long to change the natural color to a brick-red. The object of this observance cannot be determined, as there were found no human remains in this association. Upon this layer was placed ten feet of earth, rounded up, which completed the structure.

Thus, I think, it is evident that this mound was used for sepulchral purposes, or if for sacrificial purposes, human victims were the offerings. The absence of an enclosure shows that this class of structures is not necessarily excluded from the "sacred places." I am inclined, therefore, to concur in the opinion of Sir John Lubbock, that in these instances "we have before us a sepulchre rather than a temple." *

As, however, this class of mounds forms one of the most interesting chapters in the explorations of Squier and Davis, I propose to give a full abstract of their views.

"The altars or basins found in these mounds," observe these authors, "are almost invariably of burned clay, although a few of stone have been discovered. They are symmetrical, but not of uniform size and shape. Some are round, others elliptical, and others square or parallelograms. Some are small, measuring barely two feet across, while others are fifty feet long by twelve or fifteen feet wide. The usual dimensions are from five to eight feet. All appear to have been modelled of fine

FIG. 12.



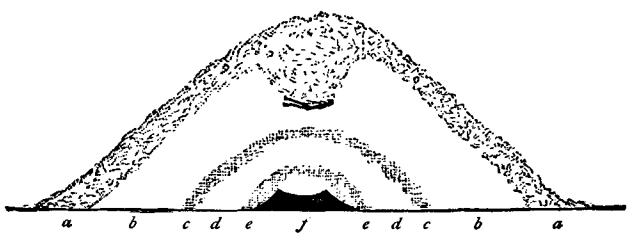
Plan of the altar.

* "Pre-Historic Times," p. 271.

clay, brought to the spot from a distance, and they rest on the original surface of the earth. In a few instances a layer or small elevation of sand has been laid down, upon which the altar was formed. The height of the altars, nevertheless, seldom exceeds a foot or twenty inches. This is hardly to be explained by any degree or continuance of heat, though it is manifest that in some cases the heat was intense. On the other hand, a number of these altars have been noticed which are very slightly burned, and such, it is a remarkable fact, are destitute of remains."*

The authors give the following section of a mound explored by them at "Mound City," near Chillicothe, Ohio, as illustrative of this peculiar stratification, although no two are alike in all their details:

FIG. 13.



Section of an Altar Mound.

a. Layer of gravel and pebbles, 1 foot.
b. Layer of earth, 3 feet.
c. A thin stratum of sand.
d. Layer of earth, 2 feet.
e. Stratum of sand.
f. Position of the altar.

The altar was in the form of a parallelogram, measuring at its base 10×8 feet, and at the top, 6×4 feet.

* "Ancient Monuments," etc., p. 143, *et. seq.*

Its height was eighteen inches, and the dip of the basin was nine inches. Within the basin was a deposit of ashes, unmixed with charcoal, three inches thick, much compacted by the weight of the superincumbent earth, intermingled with which were fragments of pottery and shell-beads. The lower sand stratum rested directly on the outer sides of the altar. About three feet below the apex of this mound were found two well-preserved skeletons, which, from the interruption of the upper layers, showed that the Indians had used this mound for intrusive burials.

From one of the mounds in this vicinity our authors obtained not far from two hundred pipes carved in stone, many pearl and shell-beads, numerous discs and tubes of copper, and a number of other copper ornaments covered with silver. The pipes were much broken, and some of them were calcined by heat which had been sufficiently strong to melt copper, masses of which were found fused together in the basin of the altar. The pipes were mostly composed of a red porphyritic stone, somewhat resembling the pipe-stone of Coteau des Prairies, excepting that it was of greater hardness, and was interspersed with small variously-colored granules. Nearly all the articles carved in limestone were calcined.

In another excavation, instead of finding an altar at the base of the mound, our authors found two layers of hornstone chipped in the form of discs and spear-heads, placed side by side a little inclining. In an excavation six feet long and four wide, not less than six hundred of these articles were thrown out. The material must have been brought from a long distance and fashioned with great toil, and, therefore, the offering, for whatever purpose designed, must have been a costly one.

Dr. Hoy, in investigating some of the mounds in the vicinity of Racine, Wisconsin, met with a somewhat similar deposit.

What strange rites were practised around these altars will forever, in some degree, be veiled from our comprehension, but the past is not altogether inscrutable. The Mound-builders worshipped the elements — the sun, the moon, and particularly fire. They erected their fire-altars for sacrifice, on the highest summits. Like the Persian sun-worshippers, they, undoubtedly, had their Magi, without whose presence the sacrifice could not go on. No gifts were too costly to be offered up. The most elaborately carved pipes, precious stones brought from a distance, and garments woven with patient toil, were freely condemned to undergo the ordeal of fire. But this was not all. The numerous reliquiæ of charred bones leave behind the terrible conviction that, on these occasions, human victims were offered up as an acceptable sacrifice to the Elements.

Herodotus, I opine, has described the counterpart of some of the scenes which were enacted in the Mississippi Valley in ancient times.

"The customs which I know the Persians to observe, are the following: . . . Their wont is to ascend the summits of the loftiest mountains and there offer sacrifice to Jupiter, which is the name they give to the whole circuit of the firmament. They likewise offer to the sun and moon, to the earth, to fire, to water, and to the winds. These are the only gods whose worship has come down to them from ancient times. . . . To these gods, the Persians offer sacrifice in the following manner: They raise no altar, light no fire, pour no libations; there is no sound of the flute, no putting on of chaplets, no consecrated barley-cake; but the man

who wishes to sacrifice, brings his victim to a spot of ground which is pure from pollution, and there calls upon the name of the god to whom he intends to offer. It is usual to have the turban encircled with a wreath, most commonly the myrtle. The sacrificer is not allowed to pray for blessings on himself alone, but he prays for the king and for the whole Persian people, among whom he is of necessity included. He cuts the victim in pieces, and having boiled the flesh, he lays it out on the tenderest herbage that he can find, trefoil especially. When all is ready, one of the Magi comes forward and chants a hymn, which they say recounts the origin of the gods. It is not lawful to offer sacrifice unless a Magus is present."*

The sun-worshippers of Mexico practised the same horrible rites, of which Bernal Diaz was an eye-witness. "On a sudden," he relates, "our ears were struck by the horrific sound of the great drum, the timbrals, horns, and trumpets in the temple of the war-god. We all directed our eyes thither, and, shocking to relate! saw our unfortunate countrymen driven by force, cuffs, and bastinades to the place where they were to be sacrificed, which bloody ceremony was accompanied by the mournful sound of all the instruments in the temple.

"We perceived that when they had brought the unfortunate victims to the flat summit of the body of the temple, where were the adoratories, they put plumes upon their heads, and with a kind of fan in the hand of each, made them dance before their accursed idols. When they had done this, they laid them upon their backs, on the stone used for the purpose, where they cut out their hearts, alive, and having presented them yet palpitating to their gods, they drew the bodies down

*"Herodotus," book i, chaps. 131-132.

the steps by their feet, where they were taken by others of their priests." *

Man has not yet learned that the incense of human blood is not acceptable to his Maker!

Neither among the ancient Persians nor among the Aztecs, does fire appear to have been employed in these human sacrifices, but we find closer analogies among the ancient Britons and the modern Hindoos.

The fact of the stratification of these mounds has led to the rash inference that they were not of artificial origin. The historian of the United States, basing his conclusions on the assertion of the late President Hitchcock, who never investigated their structure, has declared that the Mississippi Valley has no monuments; that where the antiquarian of vivid imagination sees the vestiges of artificial walls, the geologist sees but crumbs of decaying sandstone; that where the one sees parallel intrenchments, the other sees but a trough that subsiding waters have ploughed through the centre of a ridge; and that where the one sees a tesselated pavement, the other sees but a layer of pebbles aptly joined by water.†

With a vast accumulation of facts before us, bearing on the artificial origin of these works, it is not necessary to go into the serious refutation of such hastily-adopted conclusions;—to show that water does not throw up ridges in mathematical figures, such as the square and circle; that in its excavating power it does not leave behind polygons and pyramids; that, without disturbing the impalpable ashes upon the hearths of a prehistoric race, it cannot arch them over with a stratum of sand; and that it has no power to transport mica

* "The True History of the Conquest of Mexico," 1568. Quoted in "Flint Chips," pp. 314-315.

† Bancroft's "History of the United States," vol. iii, p. 307.

plates for a thousand miles, and arrange them with the precision of scales upon an ancient corselet.

Stratified mounds have been noticed in other parts of the world. Thus, according to Canon Greenwell, two mounds, in the group known as the "Three Houes," on Egton South Moor, Yorkshire, England, were found to be composed of alternate layers of sand and turf; "the bands of yellow sand and dark-colored turf showed a beautiful section as we proceeded." A still more remarkable mode of construction was noted in a mound on Hall Moor, near Castle Howard. A stratum of sand, gravel, and clay, eighteen inches in thickness, burnt into a hard mass, was met with, at the depth of three feet from the surface of the barrow. At and around the center it was almost as hard and red-colored as brick, and must have been subjected to strong, long-continued heat. The calcined human remains reduced to a small compass, were found near the center of the mound, resting on this burnt stratum, in a barrow made of sand near the above mound. The remains of a burnt body had been deposited in a simple cist sunk about six inches below the level of the surface soil. Over this cist and overlapping it, was a layer of charcoal, one inch in thickness, and above this was a stratum of clay and sand hardened by fire, about four inches in thickness, which extended through the whole barrow.

Chambers constructed of timber similar to those described by Squier and Davis, have been observed in the Yorkshire tumuli. In one was found an inhumed skeleton with a "food-vessel," and in the mound were one long and four round flint scrapers, and a flint spear-head delicately chipped.*

* Greenwell, "Account of Grave-hills in North Riding." "Archæological Journal," vol. xxii, p. 113, *et seq.* Quoted by Stevens. "Flint Chips," p. 404, *et seq.*

Temple-mounds.— Under this head Squier and Davis include such mounds "as are distinguished by their great regularity of form and general large dimensions. They consist chiefly of pyramidal structures, truncated and generally having graded avenues to their tops. In some instances they are terraced or have successive stages. But whatever their form, whether round, oval, octangular, square, or oblong, they have invariably flat or level tops."* The summits of these structures were probably crowned with temples, but having been constructed of perishable materials, all traces of their existence have disappeared.

The truncated pyramidal form, which often rises to no great height, was obviously the foundation for such structures. In the works at Aztalan, Wisconsin, we trace the outlines of this form of mounds at the angles of the bastions, and this may be said to be their northern limit. They are not recognized on the southern slope of Lake Erie, and are seen at only three points in southern Ohio, viz: Marietta, Newark, and Chillicothe. The stupendous mound at Cahokia, in Illinois, with its graded way, its terrace, and level summit, was the best representative of this class. In Kentucky, they are not rare; the great mound near Florence is of this character, and that near Claiborne—fifty feet in height—has a level summit with a gradual slope on the east, and a succession of ten terraces on the west. In this class, too, must be included the great mound at Seltzertown, Mississippi, and most of those in the Gulf States. In Mexico and Central America, we see the culmination of this form in the Teocallis, which were faced with flights of steps, and surmounted by temples of stone.

The temple-mounds were also used as sepulchers. In

* "Ancient Monuments," etc. p. 173.

that at Seltzertown, Dr. Dickeson found "vast quantities of human skeletons;" and Mr. Hill, the former owner of the Cahokia Mound, in sinking a well on its platform, encountered charcoal at the depth of twenty-five feet. The Grave Creek Mound, which is in the form of a truncated cone — the flattened area on the top being fifty feet in diameter, and therefore coming under the classification of temple-mounds, — was found to enclose two vaults originally constructed of wood, which contained human skeletons.

There are those who, in the truncated pyramids, see evidences of Egyptian origin. The pyramids, like the temple-mounds, were used for sepulchres, but here the analogy ends. The Mound-builders burned the bodies of the dead, or left them to be resolved into dust by the slow process of decay; but the Egyptians, believing that the soul would again tenant the body, resorted to expensive processes for its preservation. The same remarks will apply when we institute a comparison between the Teocallis of Central America and the Pyramids. They differ, both in the mode of construction and the object aimed at. The pyramids are complete in themselves, and as they tower up in the Nile Valley, the eye at once takes in the coherence of the several parts. The Teocallis form but a part of the general plan; — they were but the foundations for more elaborate structures. "There is no pyramid in Egypt," says Stevens, "with a palace or temple upon it; there is no pyramidal structure in this country (Central America) without." * The pyramids, according to Herodotus, were originally coated with stone from base to summit; the Teocallis have flattened summits, with flights of steps descending to the base.

* "Central America," vol. ii., p. 440.

The truncated pyramid is among the strongest links in the chain which connects the ancient inhabitants of the Mississippi Valley with those of Mexico and Central America. In the rude earthworks we see the germ of the idea which was subsequently wrought out in proportions of beauty and harmony, giving origin to a unique style of architecture.

Sepulchral mounds.—These consist, often, of a simple knoll, or a group of knolls, of no considerable height, without any definite arrangement. Examples of this character may be seen at Dubuque, Merom, Chicago, and Laporte, which, on exploration, have yielded skulls differing widely from the Indian type. It often happens that in close proximity to a large structure there is an inconsiderable one, which will be found rich in relics. Squier and Davis have stated that it is rare to find more than one skeleton entombed in a mound, but subsequent explorations have shown that they were often used as places for general burial. The corpse was almost invariably placed near the original surface of the soil, enveloped in bark or coarse matting, and in a few instances, fragments of cloth have been observed in this connection. Sometimes a vault of timber was built over it, and in others it was enclosed in long and broad flags of stone. Sometimes it was placed in a sitting position, again it was extended, and still again it was compressed within contracted limits. Trinkets were often strung about the neck, and water-jugs, drinking-cups, and vases, which probably contained food, were placed near the head. The comparative absence of warlike implements is a noticeable fact, which will hereafter be commented upon. Over the corpse thus arrayed, a circular mound was often raised, but sometimes nothing more than a hillock. This fact has led some to infer,

on what I think insufficient grounds, that these different classes of grave-hills indicate the work of separate races. If the "future New Zealander" were to visit one of our church-yards, which had been abandoned for a thousand years, and, groping among the ruins and finding one class of graves marked by elaborately-wrought monuments, and another by simple head-stones, were to infer that they were the work of different races, it is evident how erroneous would be his inferences.

Dr. Morton has said "that from Patagonia to Canada, and from ocean to ocean, and equally in the civilized and uncivivilized tribes, a peculiar mode of placing the body in sepulture has been practised from immemorial time. This peculiarity consists in the sitting posture." * No assertion could be more sweeping and less consistent with facts. No prevailing system of burial obtained among the Mound-builders, as we have shown, nor was this posture peculiarly an American usage.

Both cremation and inhumation were practised, and I doubt not at the same time. The charcoal layer is a frequent accompaniment, but it is often wanting. "The ceremonies of interment," Squier and Davis aptly remark, "so far as we are able to deduce them from these monuments, were conducted with great regularity and system. . . . All the circumstances seem to indicate that burial was a solemn and deliberate rite, regulated by fixed customs of perhaps religious or superstitious origin." †

The details of explorations at points far asunder, will give the reader a clearer idea of the funeral ceremonies

* "Crania Americana," p. 244.

† "Ancient Monuments," pp. 196 and 197.

practised by the Mound-builders than a general description.

The Grave Creek Mound, twelve miles below Wheeling, in West Virginia, is the most notable of all those in the Ohio Valley.

FIG. 14.



Grave Creek Mound West Virginia.*

It is seventy feet in height by nine hundred in circumference, and is destitute of lines of circumvallation. In 1838, Mr. A. B. Tomlinson, the owner of the premises, carried a drift along the original surface of the ground to the centre of the mound, and sank a shaft from the summit to intercept it. "At the distance of one hundred and eleven feet," he states, in a pamphlet published after the completion of the explorations, "we came to a vault, which had been excavated before the mound was commenced, eight by twelve feet and seven in depth. Along each side and across the ends, upright timbers had been placed, which supported timbers thrown across the vault as a ceiling. These timbers were covered with loose unhewn stone, common to the neigh-

* This sketch is reduced from Squier and Davis.

borhood. The timbers had rotted and had tumbled into the vault. . . . In this vault were two human skeletons, one of which had no ornaments; the other was surrounded by six hundred and fifty ivory (shell) beads, and an ivory (bone) ornament, six inches long."

In sinking the shaft, at thirty-four feet above the first or bottom vault, a similar one was found, enclosing a skeleton which had been decorated with a profusion of shell-beads, copper-rings, and plates of mica. To form a just idea of the profusion of these ornaments, it may be stated that the discs, cut from the shell of the *Busycon perversum*, numbered 2,350; the small shells, known as *Marginella apicina*, which had been pierced at the shoulder for stringing, numbered 500; and the specimens of mica reached 250. About two years after the excavation, a small flat stone, inscribed with antique alphabetical characters, was produced by the proprietor, which, he claimed, was one of the relics taken from the mound. This stone has been the subject of much archæological learning, and the characters are pronounced by Schoolcraft "to be such as were used by the Pelasgi, which is the parent of the modern Runic, as well as the Bardic." Like the "Cincinnati Stone," and the "Holy Stone of Newark," it is undoubtedly a stupid forgery.

Another observer, Dr. Clemens, states that "in carrying in the horizontal excavation, at a distance of twelve or fifteen feet, were found numerous masses composed of charcoal and burnt bones. . . . On reaching the lower vault from the top, it was determined to enlarge it for the accommodation of visitors, when ten more skeletons were discovered."

These facts show that the principal occupant of this mound, as indicated by its magnitude, was a royal per-

sonage; and can we not draw the further inference that many of his attendants were strangled, and others were sacrificed as a burnt offering? Have we not an explanation of many of these facts, in the ceremonies which attended the burial of a Scythian king, as described by the Father of History?

"The body of the dead king," says Herodotus, "is laid in the grave prepared for it, stretched upon a mattress; spears are fixed in the ground on either side of the corpse, and beams are stretched across above it to form a roof, which is covered with a thatching of osier twigs. In the open space around the body of the king, they burn one of his concubines, first strangling her, and also his cup-bearer, his cook, his groom, his lacquey, his messenger, some of his horses, firstlings of all his other possessions, and some golden cups, for they use neither silver nor brass. After this they set to work and raise a vast mound above the grave, all of them vying with each other, and seeking to make it as tall as possible." *

NOTE.—The tomb of a Scythian king was opened at Kertch, the ancient Panticapæum, about a quarter of a century ago. The tumulus which was erected over it was one hundred and sixty-five feet in diameter, formed partly of earth and partly of rough stones. In the centre was a sepulchral chamber, fifteen feet by fourteen, with a vestibule about six feet square. Both were built of hewn stones, three feet long and five feet high. The vestibule was empty, but the chamber contained a number of most curious relics. The chief place was occupied by a large sarcophagus of yew wood, divided into two compartments, in one of which lay a skeleton of unusual size, shown by its ornaments, especially a golden crown or *mitra*, to be the king, while in the other were a golden shield, an iron sword, with a hilt richly ornamented and plated with gold, a whip, the remains of a bow and bow-case, and five small statuettes. By the side of the sarcophagus, in the open space of the tomb, were, first, the bones of a female, and among them a diadem and other ornaments in gold and electrum, showing that she was the queen;

* "Herodotus," book iv., chapter 71.

In a mound removed at Vincennes, Indiana, in 1859, the lowest stratum consisted "of a bed of human bones arranged in a circle eighteen feet in diameter, closely packed and pressed together. . . . Skulls, tibiæ, ribs, and vertebræ were promiscuously mingled, as though a pile of bodies had been heaped up."

Mr. Collett describes a burial vault at Merom, Indiana, "three stories high," on each floor of which "from five to seven human skeletons were found."*

In removing the mound at St. Louis, according to Mr. James M. Loring,† which was about thirty-five feet high, there was found at the depth of twenty-five feet, what was once apparently a trench or grave, four feet deep, eighteen feet broad, and seventy feet long, in which had been buried several human bodies. The bones, which had advanced very far towards decomposition, indicated that they belonged to individuals rather above the ordinary size. The heads were placed towards the east, and the skeletons occupied a reclining posture. In this connection were found patches of cloth of a coarse texture, and more or less carbonized; two copper vessels, formed like a spoon-bowl; a quantity of beads which evidently had been strung and wound around the neck and head of the

secondly, the bones of an attendant; and thirdly, in an excavation in one corner, the bones of a horse. There were also found electrum beautifully chased, two silver vases containing drinking cups, four amphoræ in earthen-ware which had held Thasian wine, and three large bronze cauldrons, containing mutton bones. There was sufficient evidence to show that suits of clothes had been hung from the walls, and even fragments of musical instruments were discovered. The antiquity of this tomb has been estimated at only 400–350 B.C. (Rawlinson's note on Herodotus.) It must be confessed that these Scythic burial rites have a strong resemblance to those of the Mound-builders.

* "Second Report on Geology of Indiana," p. 238.

† "Missouri Democrat," April 17, 1869.

recumbent warrior; and also a quantity of small sea-shells of the same character as those found at Grave Creek.

Mr. E. O. Dunning has recently explored what is known as the Lick Creek Mound, in East Tennessee.

"I began," he states, "my operations on the east side nearest the 'Dry Creek,' as it is called, by digging a trench ten feet wide to the centre. The surface earth was composed of sandy loam, with such an intermixture of clay as would come from the removal of the top alluvium of the surrounding plain with portions of the substratum. Charcoal and ashes were observed for six or eight feet, when we came to a layer of sand a foot in thickness and several yards square. Over this was one of burnt clay, upon which lay a mass of charcoal and animal bones. The last had been broken before they were laid on the pile. Underneath the stratum of sand was a layer of decayed wood and bark, covering a human skeleton. This rested on its side and was doubled up, the leg bones pressing on the ribs — the usual position of such remains in all the mounds I have examined. Implements were deposited with the skeleton, commonly at the head, and, if a vessel of earthen ware, at the back of the skull. In one instance four vessels were deposited together. In an excavation fifteen feet in length, eight skeletons were observed too much decayed to be removed in considerable portions, each one under a layer of wood or bark — the common mode of sepulture throughout the structure. Near the centre were the remains of what appeared to have been a vault of cedar wood, indicated by rotted posts set in an upright position, describing a rectangular figure. Slabs or logs of the same material as the post had evidently connected the frame of a rude coffin or vault. Two of these tombs

were observed, one above the other, a few feet apart; within each space lay a skeleton with some of the most valuable objects sent you." *

Mr. Dunning further states that other excavations were made from the circumference to the centre, revealing the remains of fifty skeletons lying like those before exhumed. While he inferred that this large mound might have contained the common dead, he opened a small one near by, which from the profusion and beauty of the ornaments, he inferred was devoted to the chiefs. The wood and bark layer was present over all the skeletons, and a pavement of river stones a few rods square supported each frame. Whenever he struck one of these stone layers a rich deposit was sure to be his reward. The ornaments consisted of carved pipes, beads, and ornamental pins in shell, discs of chalcedony, polished axes of greenstone, serpentine, and quartz, and lance and arrow-heads.

Squier and Davis have given us a minute account of the results attending the excavation of a sepulchral mound near Chillicothe, Ohio. The mound was twenty-two feet high and ninety feet at the base. At ten feet below the surface occurred a layer of charcoal, from two to six inches in thickness. The coal was coarse and clean, and seemed to have been formed by the sudden covering up of the wood while burning, inasmuch as the trunks and branches perfectly retained their form, though entirely carbonized, and the earth above as beneath, was burned to a reddish color.

At the depth of twenty-two feet, and on a level with the original surface was a rude sarcophagus, or frame-work of timber, seven by nine feet and twenty-two

* "Fifth Annual Report Peabody Museum," by Professor Jeffreys Wyman, p. 12.

inches high, reduced to an almost impalpable powder, but the cast of which was still retained in the hard earth. The top had evidently been covered by other timbers, and at the bottom was laid a matting of bark, or thin strips of wood.

Within this rude coffin were the remains of an extended skeleton with the head to the west.* In another mound explored in the vicinity at the base of which a skeleton was discovered enveloped in bark, the head was directed towards the south.

In the so-called bastions at Aztalan, Wisconsin, Lapham found the corpse occupying a sitting posture, and I have observed the same fact in excavating the mounds in the regions of Dubuque and Chicago.

This usage of burying in a sitting posture was not confined to this hemisphere. Herodotus, speaking of the wandering tribes of Northern Africa, says: "They bury their dead *according to the fashion of the Greeks.* . . . They bury them sitting, and are right careful when the sick man is at the point of giving up the ghost, to make him sit, and not to let him die lying down." †

The ancient Britons often buried their dead in the same position, the hands raised to the neck, and the elbows brought to the knees.

These details show three important facts: 1, That the corpse occupied no particular position in reference to the cardinal points; 2, That its posture was in no degree uniform; and, 3, That many of the mounds were used for miscellaneous burial.

The stone cists surmounted by hillocks of earth, which occur in Indiana, Illinois, Missouri, and Tennessee, have been described with sufficient minuteness in chapter iii.

*"Ancient Monuments," p. 162.

†"Herodotus," book iv, chapter 190.

The comparative absence of warlike implements in the mounds is a peculiarity which also characterizes the decorations of Palenque and Copan, and hence Stevens infers that the people were not warlike, but peaceable and easily subdued. It is, certainly, a singular fact, that whilst other nations illustrated their glory by depicting battles and seiges, there should, on these monuments, be an entire absence of these representations of human conquest.

That men in the early stages of society should resort to the practice of erecting mounds over the dead, seems but natural. There is an instinctive desire on the part of the living to indicate the last resting place of a departed friend by some permanent memorial, and at the same time, to protect his remains from all profane intrusion; and no method is more effective or more easily accomplished, among barbaric tribes, than that of rearing a mound. Hence, the almost universality of the custom. Among the ancient Greeks, when a hero died, each warrior cast a shieldful of earth upon his remains, until there rose up a mound destined to form a conspicuous landmark in the coming ages.

In the Odyssey, book xxiv, the following ceremonies are described as having taken place at the funeral of Achilles:—

1. The lamentation over the dead body was continued for seventeen days and nights.
2. Numerous fat sheep and oxen were sacrificed at the pile.
3. The body was burnt in an embroidered robe, amidst jars of sweet unguent and honey.
4. A war-dance was performed round the pyre.
5. The bones of the deceased were collected from the

ashes, laid in sweet unguent and wine, and deposited in a golden urn.

6. In the same urn were placed those of his dearest friend, Patroclus; but in a separate urn, those of his next dearest friend, Antilochus, the son of Nestor.
7. Round or upon these urns a great and symmetrical tumulus was raised.
8. This stood on a conspicuous headland, expressly that it might be seen from afar by living and by future generations of men.*

In the Iliad, book xxiv, the following facts are stated with regard to the burial of Hector:—

1. For nine days wood for the pyre was collected in carts, to which oxen and mules were yoked.
2. The body was laid on the top of the pyre, which continued burning for twenty-four hours.
3. The part of the pyre which had been ignited and was still smouldering, was completely extinguished by pouring on wine.
4. The white and calcined bones were carefully picked out of the ashes by the friends of the deceased.
5. These bones were placed in a metallic urn.
6. The urn was deposited in a hollow grave, and covered over with large stones.
7. A mound, with all speed, was erected over the grave, after which the friends returned home and partook of a funeral banquet.

To show the expensiveness of these structures, in a single instance, it may be stated that, in later times, Alexander the Great caused a tumulus to be heaped over the remains of his friend Hephæstion, at the enor-

*Quoted by Stevens "Flint Chips," p. 184.

mous cost of 1,200 talents — a sum in excess of $1,000,000.

Semiramis, the great queen of Babylon, buried her husband within the precincts of the palace, and raised over his grave a great mound of earth.

The Thracians, according to Herodotus, either burnt the body of the departed, or buried it in the ground, raising a mound over the grave, and holding games of all sorts.*

Cremation, as well as tumulus-building, as shown by Jacob Grimm, was practised, according to Cæsar, by the Gauls and Celtic races; according to Tacitus, by the Germans and by the Scandinavian races, as well as by the Greeks and Romans.†

Thus we find in Western Europe, many structures of this character; — in Brittany, Denmark, in the Orkneys, and in England; and turning to the remoter parts, we find them in India, Algeria, etc. Mounds, then, are of no particular value in tracing national affinities.

Urn burial appears to have been practised to some extent by the Mound-builders, particularly in some of the Southern States. In the mounds on the Wateree River, near Camden, South Carolina, according to Dr. Blanding,‡ ranges of vases, one above the other, filled with human remains, were found. "Sometimes, when the mouth of the vase is small, the skull is placed with the face downwards in the opening, constituting a sort of cover. Entire cemeteries have been found, in which urn burial alone seems to have been practised. Such a one was accidentally discovered, not many years since, in St. Catherine's Island, on the coast of Georgia. §

* Book v, chap. 8.

† "Ueber das Verbrennen der Leichen," Leipsic, 1850.

‡ Cited by Squier and Davis, p. 167.

§ "Ancient Monuments," *ibidem*.

Professor Swallow informs me that from a mound at New Madrid, Missouri, he obtained a human skull, enclosed in an earthen jar, the lips of which were too small to admit of its extraction; it must therefore have been moulded on the head after death.

A similar mode of burial was practised by the Chaldeans, where the funeral jars often contain a human cranium much too expanded to admit of the possibility of its passing out of it; so that, "either the clay must have been modelled over the corpse, and then baked, or the neck of the jar must have been added subsequently to the other rites of interment." *

Cave burial was also probably resorted to by the Mound-builders. Human remains have been found under such circumstances in Kentucky, Indiana, Tennessee, and in other States, but as it is impossible to identify these cave-tenants clearly with the Mound-builders, I content myself with this passing notice.

Mounds of observation.—Crowning the conspicuous points which overlook the valleys, are often seen mounds which Squier and Davis suggest, may have been signal or alarm posts.

"Between Chillicothe and Columbus, on the eastern border of the Scioto Valley," say they, "not far from twenty may be selected, so placed in respect to each other, that it is believed, if the country were cleared of forests, signal fires might be transmitted in a few minutes along the whole line. On a hill opposite Chillicothe, nearly six hundred feet in height, the loftiest in the entire region, one of these mounds is placed. . . . A fire built upon it would be distinctly visible for fifteen or twenty miles up, and an equal distance down the valley." The works at Merom, Indiana, are situ-

* "Rawlinson's 'Herodotus,'" Book i., chapter 198 — note.

ated on a narrow ridge, one hundred and seventy-five feet above the Wabash Valley. The boldest bluffs in the vicinity of Dubuque are crowned with mounds, from which an immense reach of the Mississippi can be comprehended by the observer. At Vincennes, an outlier of the upper terrace has been rounded into a mound, which forms the most conspicuous feature in the landscape. Whether these mounds were used merely as lookouts may well be doubted. Their position shows that the sites were selected in reference to their picturesque beauty, and were eligible, whether for occupancy, for sacrificial, or sepulchral purposes.

CHAPTER VI.

THE MOUND-BUILDERS — THEIR ARTS AND MANUFACTURES.

THERE is a striking similarity in the implements of barbarous nations, however widely-separated, and this similarity extends not only to their form, but to the material employed. Too much importance must not be attached to these coincidences in tracing national affinities. If we were to suppose that a person in the full possession of his physical powers, but with no previous experience, were placed on an uninhabited island and compelled to rely on his own ingenuity for acquiring a subsistence, he would first resort to the pebble as an auxiliary power. With this, like some of the monkey tribes, he could crack nuts; and when hurled, it would be more effective than a blow dealt with the clenched hand. If he succeeded in capturing any small game, he would learn that this pebble, chipped to a sharp edge, would materially aid him in stripping off the hide or disembowelling the carcass. A brief experience would teach him that certain kinds of stone possessed this property to a greater extent than others, but that of all kinds, obsidian, flint, and chert were the most readily cleavable, and that with these, he could cut, or saw, or pierce, or drill, or bore. With his new experience, he would, ere long, find that a slender reed, tipped with a

flint-point and pear-shaped, could be hurled more accurately and more effectively than a pebble, and hence the javelin. Improving on this idea, and finding that the branches of trees had an elastic force, and the sinews and entrails of the deer had great tensile strength, he would construct a bow and reduce his javelin to the size of an arrow. He now finds himself in possession of a weapon capable of repeated discharges, and with which he can bring down the largest as well as the smallest game. Still experimenting, he finds that if his arrow-head is barbed, it will cling to the side of his victim, and he has but to follow in the trail to secure his prey. Thus equipped, the Indian, at this day, brings down the buffalo on the plains, and shrinks not from an encounter with the ferocious grizzly bear of the mountains; and the Hottentot undaunted assails the lion and rhinoceros.

While our unenlightened Crusoe finds in the flint-flake so many applications, there are other processes, such as hacking and pounding, to which, by reason of its frangibility, flint or obsidian is not adapted. A tougher material is required, and this he finds in greenstone and porphyry. He selects a water-worn pebble as near the desired shape as possible, and to secure it to a handle for the purpose of being wielded, he cuts a groove at one end, and with the deer's sinew lashes it securely; and that the mass shall oppose the least resistance to the surface to be cut away, it is ground down wedge-shaped. Greenstone, flint, and chert are common to almost every region of the earth, and the human race, wherever dispersed, appear, as it were, instinctively to have become possessed of a knowledge of their respective properties. In the volcanic regions of Mexico, at this day, obsidian is largely employed, where iron is attain-

able. In Colorado, I have seen beautiful arrow-heads of chalcedony; and the Indian of the mountains will economize the thick parts of a junk-bottle which some traveller has cast aside, by chipping it into such weapons.

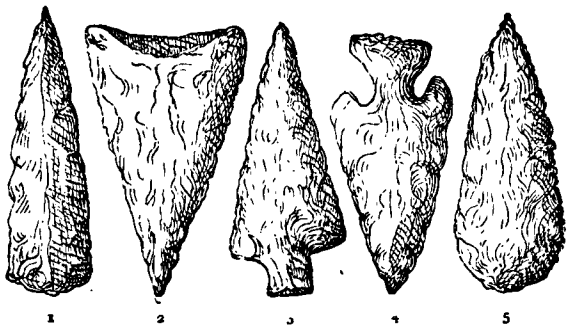
These flint-flakes are made very rapidly, not by blows but by strong pressure. Torquemada, as quoted by Tylor,* has given us a description of the manner in which the Aztecs obtained their obsidian flakes. One of the Indian workmen sits upon the ground, and selecting a piece of this stone, say, eight inches long and as thick as one's leg, with a stick as large as the shaft of a lance, and a little more than three cubits long, to the end of which is firmly fastened another piece of wood eight inches long to give it more weight, he commences operations. He brings his feet together, securing the stone as in a vise, then taking the stick in both hands, and pressing one end against his breast and setting the other well home against the edge of the front of the stone, and exerting a strong pressure, off flies a knife, which is sharpened on a stone to give it a fine edge. "In a very short time," says our author, "these workmen will make more than twenty knives in the aforesaid manner." †

Arrow-heads.— The arrow-heads of Europe have been classified by Sir R. W. Wilde into five divisions: 1, Those which are *triangular;* 2, Those which are *indented* at the base; 3, Those which are *stemmed;* 4, Those which are *barbed;* and, 5, Those which are *leaf-shaped.* All these forms are represented in the United States, as will be seen by the subjoined illustrations taken from specimens in the Collection of the Historical Society of Chicago.

* "Anahuac," etc.

† As to the mode of manufacture, see Lubbock, "Pre-historic Times," p. 84.

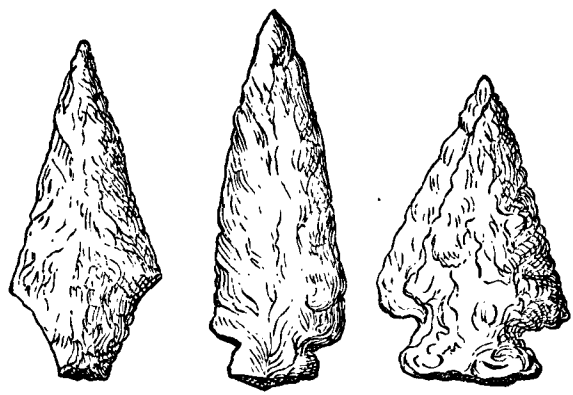
FIG. 15 — ⅔.



Different forms of arrow-heads.

Three other forms occur which are sufficiently distinctive to justify an enlargement of the above classification. They may be designated, 6, Those which are *lozenge-shaped;* 7, Those which are *dirk-shaped;* and, 8, Those which are *bevelled.**

FIG. 16 — ⅔.



Different forms of arrow-heads.

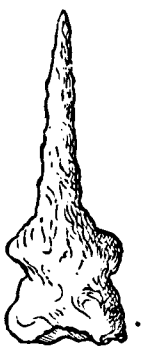
* For the purpose of comparison with European forms, *vide* Lubbock's "Pre-historic Times," p. 103.

Nos. 6 and 7 are common, but No. 8 is rare. The specimen represented is from Professor Cox's Collection, and the two edges are symmetrically bevelled, as if to give it a rotary motion. The angle measures exactly 45°. The material is yellow chert.

As most of the arrow-heads in the various collections have been picked up in ploughed fields, and have no local history attached to their discovery, it is impossible to determine how far they are the work of the Mound-builders; in fact, it may be said they are rarely found in the mounds.

Colonel Long states that the Indians of the West use two kinds of arrows; the one for hunting, the other for war. The hunting arrow is armed with a leaf-shaped or triangular head, sometimes with a stemmed head, but never with one possessing barbs. The war-arrow has invariably a barbed head. This is very slightly attached to the shaft, so that if the arrow enters the body of an enemy, it cannot be withdrawn without the head being left in the wound. The hunting arrow, on the contrary, has the head firmly attached to the shaft by the binding of a deer's sinew.*

FIG. 17 — ⅔.



Rimmer of chert. (Prof. Cox's Collection.)

Rimmers and borers. — Many of the implements of the Mound-builders, such as their pipes, discs, and gorgets, are bored and rimmed, and there is little doubt that for this purpose, where the material was soft, they employed an instrument like that represented in the margin. They are very common in most collections.

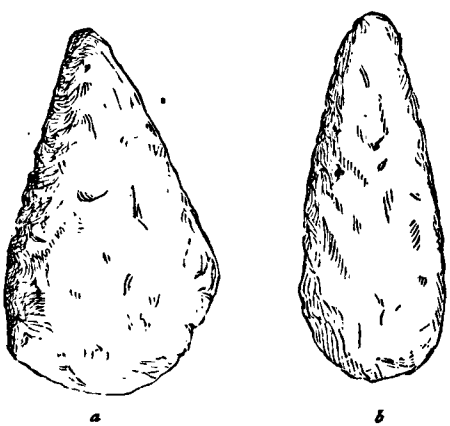
In some of the pierced implements

* "Expedition to Rocky Mountains," vol. i, pp. 290–1.

left unfinished, a core has been found in the bottom, and this circumstance has led Mr. Charles Rau to suggest that the drilling was accomplished by a hollow tube, perhaps a joint of the cane, attached to a bow-drill to give it a rotary motion, and feeding it with sharp sand.* The holes are sunk with perfect accuracy, showing that the implement was turned by an apparatus which was far more efficient and precise than the human hand. In those specimens where the hole displays concentric rings and a funnel-like form, there can be little doubt that the rimmer was employed.

Agricultural implements.— Their agricultural instruments, which are chipped out of chert or quartzite,

FIG. 18.



Spades found in the vicinity of Alton, Illinois. (Chicago Historical Society's Collection.)

a. Dimensions, five and one-half by thirteen inches.
b. " four and one-half by seven and one-half inches.

* "Smithsonian Report," 1868, p. 398.

evince great skill. The finest specimens are obtained from the American Bottom, opposite St. Louis. Above are represented two forms in the nature of spades, from the vicinity of Alton, Illinois, but so far reduced as to convey an inadequate idea of their magnitude, except by protraction.

These implements show superior workmanship, and are the largest which I have ever seen, in which the flaking process has been employed. They are flat on one side and slightly oval on the other, and the smaller end was undoubtedly attached to a handle, for it shows the conchoidal fracture unobliterated, while the broader end is polished as if from digging. Mr. Rau has figured, in the report before referred to, a hoe from a mound near Illinoistown, seven and one-half by six inches, and about half an inch thick in the middle, with two notches in the upper part for the attachment of a handle.*

In the collection of Mr. Perkins, to which I shall have occasion to refer more particularly, there are twelve ovoid implements of chert, sharp-pointed at each end, perfectly symmetrical in form, most dextrously chipped, and variable in size. The one before me is nine and one-half by five and three-fourths inches in diameter, and is the third in size. I am disposed to think that

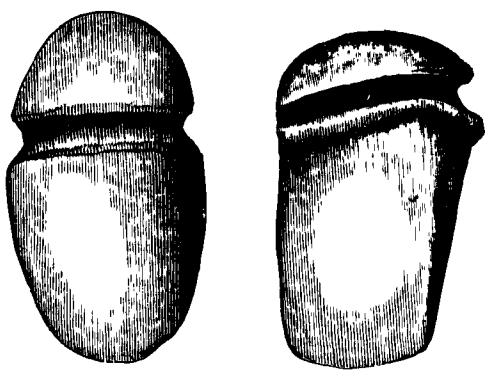
* I may not have given proper space to the description of flint implements, but I feel the necessity of abridgement. Mr. Perkins has many arrow-heads which are almost as delicately-serrated as a shark's tooth, and many spear-heads of chert and quartzite, which evince exquisite skill in their manufacture, as though each blow was designed to produce a definite result, and nothing beyond.

The same exquisite finish is to be observed in many of the spear-heads secured by Dr. Veile, in Yucatan. Classifying these implements as appertaining to the Stone Age, according to the received authorities, I have only to say that they evince a higher degree of skill than is displayed in the ground and polished axes.

they were designed for agricultural purposes. (Found in Lake County, Illinois, in a nest, one above the other, the largest at the bottom.)

Celts.—I now proceed to the description of a class of utensils represented by the axe, chisel, flesher, amulet, pendent, etc., of ground and often polished stone; and by the spear-head, arrow-head, knife, dagger, etc., of metallic copper; which are supposed to display a higher degree of skill, and a greater advance in civilization, than belonged to the Stone Age. These utensils are known as "Celts," and no discrimination is made by archæologists, whether the material be bronze, copper, or stone.

FIG. 19—¼.



a *b*

a. Porphyry; crystals of feldspar, in a red paste.
b. Greenstone. (Chicago Historical Society's Collection.)

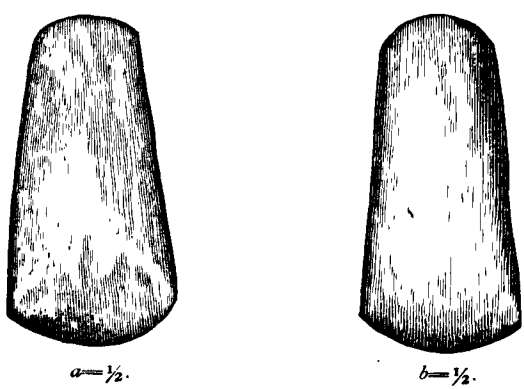
Axes.—The stone-axe was among the most efficient utensils of the Mound-builder. With it he could attack the forest, and, aided by fire, could fashion the tree-trunk into a pirogue,—a form of boat which was adopted by European pioneers in those regions where the canoe-birch does not flourish.

Greenstone and porphyry were the materials ordinarily selected, and they were fashioned into two prevailing forms; one was cut with a crease near the head, and the other was ground down wedge-shaped, but both tapered to an edge. The first form is represented in the preceding figures, and is common to the whole region from the Mississippi to the Atlantic, including New England.

The crease, as in *b*, is continued only on three sides, and the back of the axe is left flat, so that, when lashed to the handle, it could be tightened by wedging. The average weight of these axes is about two pounds; the smallest weigh not more than one ounce, while some weigh eight or nine pounds. It is rare to find them in the mounds, but many have undoubtedly as high an antiquity as the mounds themselves.

The second form is represented in

FIG. 20.



a. Stone-axe from Alton, Illinois.
b. Stone-axe from Jackson, Indiana.

Three stone-axes have recently been found at Milwaukee, and Mr. Perkins has one in his collection, which differ from all hitherto described. They are of the usual form, but the surface is ornamented with a series of longitudinal flutings of uniform depth and width, and but slightly depressed. The axes are of large size and well finished, and the material is of the toughest greenstone (diorite). These are the only examples observed where ornamentation has been attempted in this class of implements.

The mode of attachment, in these instances, was by inserting the axe-head in a cleft stick, and binding it firmly with a leather thong or deer's sinew. Examples of such attachment are to be seen in the ancient Persian bronze axes, and in the modern African axe. The deer's antler, mortised out to receive the head, may also have been used as a handle, as among the Swiss pile-drivers, affording, as it does a material in which are united strength and toughness.*

Sometimes the material employed in these axes was brown hæmatite, which was often ground and polished with elaborate care. An axe of this character, about 6½ inches long, 5¼ broad, and 1¼ thick, was taken from a shell-heap on the banks of Grand Lake, Louisiana, by Dr. Dungan of St. Jeaneret's. What was remarkable, it exhibited a concentric structure, perfectly conforming to the outline of the axe, and where the outer layer had partly peeled off, beautiful dendritic markings were to be seen. I had observed this concentric structure in other implements made of this material, and as it is difficult to conceive that the artizan could have selected an iron nodule of the precise shape of the implement he wished to fabricate, I am forced to the conclusion that

* For the mode of attachment, see Lubbock, pp. 25 and 92.

this concretionary structure is the result of oxidation from exposure since the implement was finished.

It is not unusual to meet with perforated objects which are classified as axes, but when we consider the character of the material, a green-colored silicious slate of a banded structure, ill adapted to withstand repeated shocks, we are led to the conclusion that they were designed for ornament and not for use. A representation of this class of objects is given in

FIG. 21 = ¼.



Axe (?) perforated, from Paris, Kenosha County, Wisconsin. (In the Collection of Mr. F. S. Perkins, of Burlington, Wisconsin.)

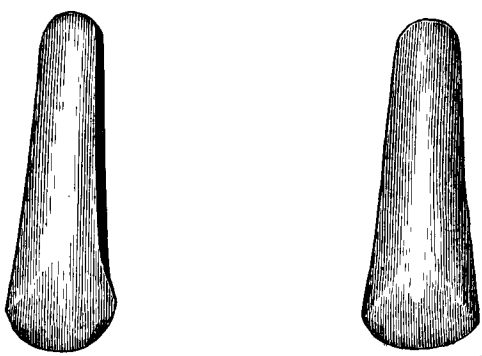
The length of the specimen is six inches, and midway it is pierced with a hole not quite half an inch in diameter, which is perfectly symmetrical, having parallel circular lines, as though it had been perforated by a drill in a fixed position, and subjected to a rotary motion.

I have before me, as I write, a collection of stone implements, gathered by Dr. J. W. Veile, in Yucatan. For the most part they conform in shape to the figures above given. The material employed is porphyry. Some of them are less than two inches in length, and the edges are polished as if from use. At the first glance it would be said that many of these implements were too small for practical purposes, but when we reflect that the material out of which the ancient inhabitants of that region cut their basso-relievos, was a soft coralline limestone, I find, by experiment, that such a tool is almost as effective as one of steel.

Some of these implements, however, are cylindrical in shape, with the convex surface brought to an edge, and the opposite side ground out like a gouge; and while the instrument does not exceed two inches in length, I can imagine that it would be effective in working out minute details in their sculptured forms.

The hammers and mauls, which will be figured in the chapter relating to "Ancient Mining," consisted of boulders of porphyry or greenstone, which were cut with a crease for the reception of a withe. Of the creased axes I find no representations in European specimens; but of the wedge-shaped, almost exact counterparts are found in Ireland and in the Swiss Lakes.*

FIG. 22.



a = ¼. *b* = ⅙.

Fleshers: *a* is of steatite, seven inches by three. (Chicago Historical Society's Collection.) *b* is of greenstone, eleven inches by four. (Chicago Academy of Sciences' Collection, presented by Mr. Chesbrough.)

Fleshers.—The stripping of the hide from animals of the chase, and its subsequent preparation to fit it for

* Compare Lubbock's figures, "Pre-historic Times," pp. 92 and 188, with those given in the text.

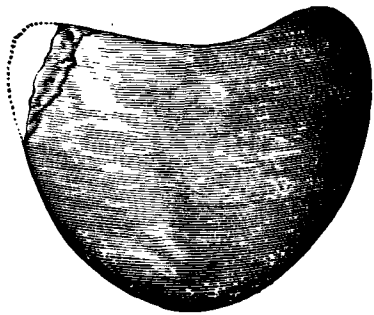
human raiment, must have been, among the Mound-builders, an important industrial art. With their copper or flint knives, the hide was first incised, and then detached from the flesh, making use of such implements as are represented above.

Mr. Titian R. Peale, the naturalist who accompanied Colonel Long's Expedition to the Rocky Mountains, has given the method employed by the Indians for the preservation of skins, a method analogous probably to that in use among the Mound-builders. "The material used," he states, "is principally the brains of the animal from which they were taken. While the skins are fresh or in their green state, they are stretched on the ground, and scraped with an implement of bone or stone, resembling an adze; the adhering portions of flesh are removed, and the surface is then plastered over with the brains, mixed in some cases with the liver, and on this is poured, from time to time, warm water in which meat has been boiled. The whole is then suffered to dry, after which the skin is again subjected to the action of the brain and hot water, further stretched, and while still wet, scraped and rubbed with stones until perfectly dry. It is further softened by rubbing and passing it backward and forward over a twisted sinew, stretched horizontally." *

In the following figure we have undoubtedly a representation ot a scraper which was employed in this process.

* "Smithsonian Report," 1870, p. 390.

FIG. 23 = ¼.



Scraper of greenstone, seven inches by six, and three-quarters of an inch at the base; ground to an edge on three sides. Found in Sullivan County, Indiana. (Professor Cox's Collection.)

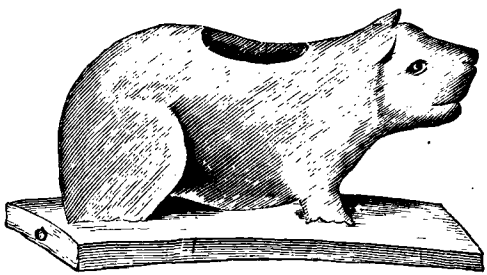
This instrument from its size, was probably held in both hands, and used very much as the currier's stretching iron is at this day; to remove any traces of tan, to press out the thick places in the hide, and to close the pores of the leather.

Pipes. — The Mound-builders were well aware of the narcotic properties of tobacco, a plant which is indigenous to America, and which, since the discovery of the western continent, has been domesticated in every region of the earth where the soil and climate are favorable to its cultivation. No habit, at this day, it may be said, is more universal or more difficult to eradicate than that of smoking. With the Mound-builder tobacco was the greatest of luxuries; his solace in his hours of relaxation, and the choicest offering he could dedicate to the Great Spirit. Upon his pipes he lavished all the skill he possessed in the lapidary's art.

"From the red stone of the quarry
With his hand he broke a fragment,
Moulded it into a pipe-head,
Shaped and fashioned it with figures."

Squier and Davis have given several representations of these objects, where we have the sculptured figures of birds, quadrupeds, and marine animals, many of which belong to a different latitude, such as the manati or sea-cow, which inhabits the warm waters of the Atlantic; the toucan, a tropical bird; the Carolina parrot, etc. Many of these pipes are sculptured from the most obdurate stones and display great delicacy of workmanship. The features of animals are so truthfully cut that often there is no difficulty in their identification, and even the plumage of birds is delineated by curved or straight lines which show a close adherence to nature. The bowl and stem piece, wrought from a single block, are as accurately drilled as they could be at this day, by the lapidary's art. This latter process was undoubtedly accomplished by machinery, but it is difficult to conceive how machinery could have cut the sharp curved lines and the ridges and depressions represented in the animal forms.

FIG. 24.



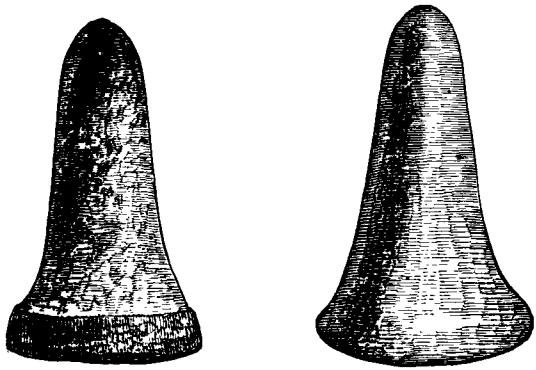
Pipe from a mound, Laporte, Indiana.

I submit one figure of this kind, the original of which is wrought from a light-colored porphyry, and is highly polished. It was obtained from a mound near Laporte, Indiana, by Dr. Higday.

It is not quite clear what animal the unknown sculptor intended to represent, but the short broad head and massive jaws would indicate that it is one of the carnivora, perhaps the puma or panther.

Pestles.— To grind maize so as to fit it for cooking, undoubtedly entered largely into the domestic economy of every Mound-builder's family. This was accomplished by the mortar and pestle. Of the latter, there is a variety of forms. Some are cylindrical, some bell-shaped, and some cone-like. The materials are also various; consisting of greenstone, sienite, quartz, etc., and sometimes of sandstone. The latter, however, has not the toughness to make a good implement. I give two illustrations.

FIG. 25.



a = ⅓. *b* = ⅓.

Pestles for pulverizing maize. (Professor Cox's Collection, Indianapolis.)

Specimen *a* is composed of sienite with a well-marked rim at the base, and was found at Corydon, Crawford County, Indiana.

The other specimen, *b*, is bell-shaped; the material is quartzite, and the locality was on the first terrace-bank of the Ohio River, near an artificial shell-heap, Perry County, Indiana.

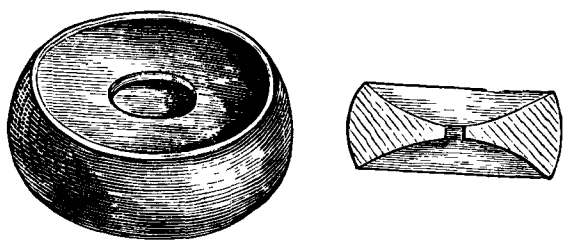
There is another pestle in this collection, of quartzite, found in Marion County, Indiana, which differs from the preceding, it being semi-cylindrical throughout. The dimensions are eleven by two and one-fourth, by one and three-quarter inches.

The foregoing examples approach in their general form, those given by Squier and Davis, Fig. 118.

Bark-peelers.— In Professor Cox's Collection, is an implement, long and cylindrical, but brought to an edge, which I am disposed to think was used as a bark-peeler, having been held in the hand. The material is a dark-colored hornblende.

Discoidal implements.— There is another class of implements of frequent occurrence, which are often symmetrically wrought and polished from the hardest materials. They are circular in form, capsule-shaped, and pierced in the centre with a hole. One of these is represented in the subjoined

FIG. 26 = ½.



a *b*

a. Discoidal stone found in Kentucky.
b. Cross section of the same. (Professor Cox's Collection.)

This specimen is of an amber-colored translucent quartz, and is symmetrically ground and polished, and, taking into consideration the hardness of the material which resists a steel edge, we have results which at this day can only be attained by the lapidary's

wheel, armed with emery or diamond dust. Nothing which I have seen among the Mound-builders' implements, with the exception of the pipes, evinces a higher degree of skill than is displayed in this specimen.

There is another implement in this collection, from the same region, of a similar form but slightly ovoid and somewhat larger, where the material employed is greenstone, and still another of sandstone, flat on one side and discoidal on the other, but without a hole in the centre. Squier and Davis have given several representations of specimens like the above, in Fig. 121 of their work.

Much speculation has been indulged in as to the uses of these discoidal stones. Schoolcraft* has suggested that they were used as quoits, and that the object of casting them was to ring an upright peg, set in the ground, but the hole is so small in many instances as to admit of no such a supposition, and in other instances it is wanting. Besides, would they employ an implement on which they had bestowed such an amount of toil in a game where it would be liable to fracture? The edges are not notched, nor is there any indication that these stones had been subjected to rough usage.

Squier and Davis have quoted a number of authorities as to Indian pastimes, in which a similar implement is used.† Thus, Mr. J. B. Finley, formerly a missionary to the Ohio Indian tribes, has described a popular game among them, much resembling "tenpins," in which the stone was grasped on the concave side by the thumb and second finger, while the forefinger pressed upon the periphery.

Du Pratz notices the same game, and shows that

* "Archæology of Aboriginal Knowledge," vol. i., p. 407.

† "Ancient Monuments," p. 223.

these stones, when rolled, would describe a convolute figure.

Adair, in his "History of American Indians," describes a favorite game among the warriors, called *Chungke*, played on a piece of level ground, kept clear, and occasionally strewn with sand. Only one or two on a side play at this game. They have a stone about "two fingers broad at the edge, and two spans round;" each party has a pole about eight feet in length, smooth and tapering at each end, the points flat. The players start off abreast of each other, at six yards from the play-ground, and one of them rolls the stone on its edge, in as direct a line as he can, a considerable distance towards the middle of the other end of the ground. When they have run a few yards, each darts his pole after the stone. Should either spear touch the stone, the player counts two of the game; and in proportion of the nearness of the poles to the mark, one is counted, unless by measurement both are found to be an equal distance from the stone. In this manner they will continue running most of the day at half speed, under the violent heat of the sun, staking their ornaments and even their wearing apparel. "All the American Indians are much addicted to this game which appears to be a task of stupid drudgery; it seems, however, to be of early origin. The hurling stones, which they still use, have been, from time immemorial, rubbed smooth on the rocks, and with prodigious labor. They are kept with the strictest religious care from one generation to another, and are exempt from being buried with the dead. They belong to the town where they are used, and are carefully preserved."*

Du Pratz, Breckenridge, Lewis and Clarke, and Catlin,

* Adair's "History," etc., p. 402.

all describe a somewhat similar pastime among the different tribes of Indians with whom they were brought in contact. Bartram describes the *Chunky-yard*, in the Creek villages, in which a similar game was played.

When we see represented on the monuments of Egypt the game of "ball," played apparently as at this day, by tossing and catching, we can well conceive how national pastimes can be perpetuated from time immemorial.

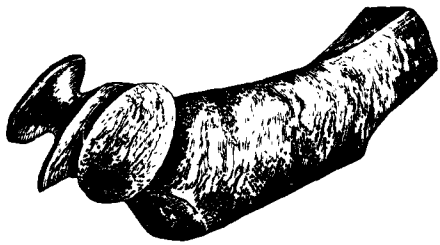
"In the plains and upon the mountains" (of Chili), says Molina, "are to be seen a great number of flat circular stones, of five or six inches in diameter, with a hole through the middle. These stones, which are of either granite or porphyry, have doubtless received this form by artificial means, and I am induced to believe that they were the clubs or maces of the ancient Chilians, and that the holes were perforated to receive the handles."*

Colonel C. W. Jenkes, from the mountain region of North Carolina, communicates to me the information that there have recently been found in the vicinity of the ancient sepulchres before described, two specimens of quartz which have been very symmetrically wrought. They are perfectly circular, eight inches in diameter, three inches thick on the outer rim, and hollowed to the depth of an inch on each side, as perfectly as though turned in a lathe. He was strongly impressed with their beauty of form and color, and the mechanical skill displayed, far above anything in mere Indian relics.

Totem? — Another implement of no practical use, but undoubtedly designed as an ornament or perhaps totem, is represented on the following page.

* Molina, vol. i., p. 56.

FIG. 27 = $\frac{2}{3}$.

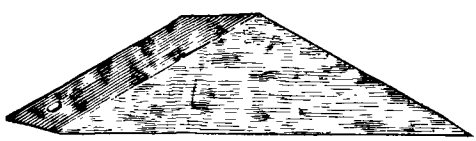


Ornamental figure, found at Jackson, Wisconsin. (In the Collection of Mr. F. S. Perkins.)

The material is the ribboned-silicious slate, so often described, and the figure, which approaches the bird more nearly than any animate object, is symmetrically carved and polished. It is, notwithstanding its incongruity, a beautiful specimen of pre-historic workmanship. Dr. Lapham sends me a similar figure in serpentine, but the eye-like appendages have been broken off.

The following implement is unique, so far as I have observed, and I have no conjecture to offer as to its use. It is of sienite, rubbed down smooth. The bottom is hollowed out boat-shaped, and it is pierced, at either end, with a hole.

FIG. 28 = $\frac{1}{2}$.



Implement found near Danville, Illinois. (Dr. J. C. Winslow's Collection.)

Textile fabrics and the implements employed in their manufacture.— The Mound-builders clothed themselves,

in part at least, not in skins like the Indian; not like the Sandwich Islander, in cloth made of the macerated bark of certain trees; nor like the dwellers of the Swiss Lakes, in matted sheets of vegetable fibre; but in cloth regularly spun with a uniform thread, and woven with a warp and woof. This evidence of their advance in civilization beyond a mere barbaric race, was first discovered by me as far back as 1838, and described in 1851;* and it is a matter of such importance in the ethnology of this mysterious race, that I will here recapitulate the facts.

As far back as 1838, while engaged in geological investigations in Southern Ohio, I procured from a person residing at Charlestown, Jackson County, several fragments of cloth which had been taken a few days previously from a low mound in that vicinity. It was found near the original surface, enveloping several sets of copper bracelets, and for the most part was so far decayed as to exhibit only the textile structure, but some of the fragments were in a good state of preservation.

This fact was so novel in itself and so at variance with the prevailing ideas as to the degree of civilization and knowledge of the arts among the Mound-builders, that I hesitated about making it public, fearing that the cloth might be a modern substitution, and that by publishing the fact, I might be the means of propagating an error.

Subsequently, in 1851, Mr. John Woods, a gentleman of high character and who occupied a responsible official position in Ohio, sent me additional samples, together

* "Description of samples of ancient cloth, from the Mounds of Ohio." Proceedings American Association for the Advancement of Science, p. 375. (Albany Meeting, 1851.)

with a minute description of the circumstances under which they were found. This evidence was so conclusive that I no longer hesitated as to the authentic character of my previous discoveries.

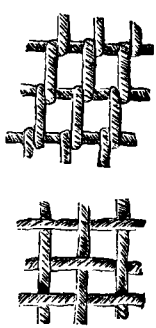
The following is a condensed statement of the facts communicated by Mr. Woods. The cloth which he sent me was taken from a mound on the west side of the Great Miami River, in Madison Township, Butler County, Ohio, two miles north of Middletown. The mound originally was about twenty feet high, and when Mr. Woods first saw it, thirty years previously, it was probably sixteen feet high. Fifty years ago, according to the testimony of the old settlers, it was covered with large forest trees. The Cincinnati, Hamilton, and Dayton Railway cuts one side of the mound, half of which had been removed to form the track. The workmen said that, in making the excavation, they had found an arrow-head and a considerable quantity of charcoal, cloth, and bones. Mr. Woods states that he took a shovel, and after removing the earth until he was sure that he was down as far as the formation had been disturbed, took out several shovelsful of earth, charcoal, and cloth, the charcoal belonging apparently to the oak and sugar maple. The workmen said that they had found pieces of cloth connected with tassels or ornaments.

About ten feet from the top of the mound there occurred a firm, compact stratum of fine clay, an inch thick, which appeared as if it had been burned until it was red; under this, near the middle of the mound, was another stratum, of a beautiful fine-yellow or cream-colored clay, entirely different from anything in the neighborhood. Under this stratum he found the charcoal, cloth, and bones. The mass was so loose that he

could almost with his hand, sink down the shovel eighteen or twenty inches, very little earth being intermixed. The charcoal was outside the cloth; the latter was in thick folds and very much charred; the bones were few and small. The strata of burnt and yellow clay did not extend through the whole mound, but occupied an area of only five or six feet broad.

The fabric in both the samples which I have described, appears to be composed of some material allied to hemp, but less readily recognized in the charred specimens from Butler County than in those from Jackson County, and the separation between the fibre and the wood appears to have been as thorough and effectual as at this day by the process of rotting and heckling. The thread, though coarse, is uniform in size, and regularly spun. Two modes of weaving are recognized: in one by the alternate intersection of the warp and woof; and in the other the weft is wound once around the warp,—a process which could not be accomplished except by hand. In the illustration the interstices have been enlarged to show the method of weaving, but in the original the texture was about the same as that in coarse sail-cloth. In some of the Butler County specimens, there is evidently a fringed border.

FIG. 29.



Cloth from mounds in Ohio.

In the specimens of pottery where the human figure is represented, there is, most generally a head-dress which, without doubt, was of cloth, and there is one statuette of a captive bound with a *twisted* band. Lapham states that a skeleton was found in one of the mounds of Wisconsin, wrapped apparently in a

cloth of an open texture, like the coarsest linen fabric, but the threads were so rotten as to make it quite uncertain of what material it was made; and in the removal of the great mound at St. Louis, a few years ago, patches of cloth of a coarse texture, more or less carbonized, were found in connection with human skeletons.

I see no reason, then, why cloth-manufacture should not be included among the arts of the Mound-builders. There is no evidence that the Indians possessed this art when first known to the White man,— an art which, when once acquired, would not be permitted to lapse; nor is the supposition plausible that this cloth was a European fabric, obtained by the Indians and substituted in the mounds with their intrusive burials, for the reason that the material employed is not such as a civilized race would manufacture to traffic with a barbarous one, it being more costly than wool, and less adapted, by reason of its rigidity and lack of warmth, to the purposes of clothing. Besides, the supposition of intrusive burial, so far as relates to the Butler County mound is not to be entertained, for Mr. Woods's statement is explicit, that the cloth was beneath two strata of clay, one burnt red, and the other cream-colored, neither of which had been disturbed.

These facts have an important bearing upon the ethnology of the people by whom the mounds were built. They go far to dissever the present race of Indians from the Mound-builders, and to link the latter to the civilized races of Central America.

When Columbus, in 1502, met a party of the Mayas from Yucatan, at an island near Ruatan, off the coast of Honduras, he found that they had come in a vessel of considerable size equipped with sails, and

that its cargo consisted of a variety of textile fabrics of divers colors, wearing apparel, etc. This testimony is emphatic, that the people of Yucatan used woven cloth, at a time when first discovered by the Europeans.

The art of spinning and weaving was also practised by the Peruvians when their country was first invaded by the Spaniards; and samples of cloth, and the distaffs on which the thread was spun, are associated with the oldest monuments. In corroboration of this, I quote the verbal statements made to me by Mr. E. O. Carter, a gentleman who passed several years in that country, and personally assisted in the exploration of many of the antiquities. Thus at Pachacamao, thirty or forty miles from Lima, where stands the Temple of the Sun, there are numerous remains of walls built of adobes or sun-dried bricks, indicating the site of a once large and compact town, but now a mass of ruins. In the *huacas* or burial-places are found numerous mummies in a sitting posture, wrapped in many folds of cloth, with an exterior covering of coarse matting. The cloth is composed of a regular warp and woof, the thread being twisted or spun, and often wrought into variegated patterns. The fabric consists of the wool of the llama or alpaca, and perhaps in some instances of cotton which there grows spontaneously. In this connection it is not unusual to find spindles, with the yarn upon them, which are sticks nine or ten inches long, terminated at one end by a button; also, various utensils indicative of the occupation of the deceased; and in some instances, personal ornaments, consisting of gold and silver, such as chaplets and bracelets. Articles of pottery, filled sometimes with maize and sometimes with cotton are abundant.

The Indians of New Mexico, when visited by Coronado, in 1540, were found wearing mantles of raw cotton, and "there was found in their houses certain yarn made of raw cotton."

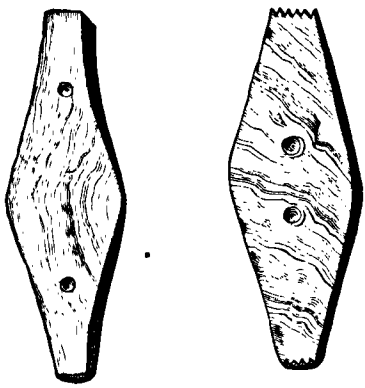
It is not necessary to suppose that complicated machinery is required to produce a good textile fabric.*

It is not known precisely in what manner the Mound-builders carried on the processes of spinning and weaving, but the following implements, of which those of an analogous structure are quite numerous, were probably employed. (Vide Fig. 30.)

Squier and Davis have figured no less than seventeen of these implements, some of which are square, some oblong, and others oval, cruciform, or lozenge-shaped, and most of which are elegantly finished. Whilst they are often found in the ploughed fields, which would give them an uncertain origin, they are also found in the mounds in connection with skeletons.

* The Hindoo, according to Ure (Dictionary of Arts, etc.,—Article "Weaving"), at this day readily extemporizes a loom by employing two bamboo rollers, one for the warp and one for the woven cloth, with a pair of treadles for parting the warp, to permit the weft to be drawn across between the upper and under threads. The shuttle is a slender rod, like a large netting needle, rather longer than the web is broad, and is made use of as a batten or lay, to strike home and condense each successive thread or weft against the closed fabric. He carries this simple apparatus, with his water-pitcher, rice-pot, and hooks, to the foot of any tree which may afford him a comfortable shade. He then digs a large hole to receive his legs, along with the treadles or lower part of the harness; he next extends his warp by fastening his two bamboo rollers at a proper distance from each other, with pins into the sward; he attaches the treadles to a convenient branch of the tree overhead, inserts his great toes into two loops under the gear, to serve him for treadles; lastly, he sheds the warp, draws through the weft, and beats it close up to the web with his rod-shuttle or batten, and thus makes a cloth which formerly found its way to the European markets.

FIG. 30 — ½.



a *b*

Gauges to regulate the size of the thread.

a is symmetrically wrought, flat on one side, and rounded on the other. It is rimmed out on both sides, but the diameter of the hole is only sufficient to pass ordinary pack-thread. This specimen was found in a ploughed field, in Marion County, Indiana, and is in the Collection of Professor Cox, of Indianapolis.

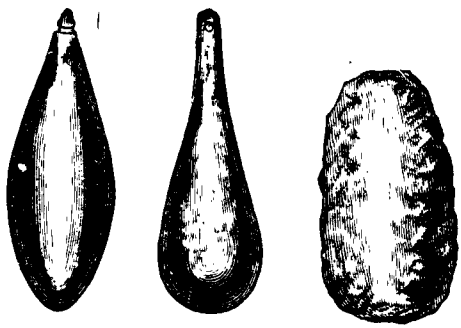
b represents a similar implement, found near Franklin, Cattaraugus County, New York, which is now in the possession of Benjamin McCleur, of Dubuque, Iowa. The second figure is very similar to one given by Schoolcraft,* and Squier and Davis have figured several relics of this description, which they regard as gorgets.†

* "Researches," etc., vol. i, p. 80.

† "Ancient Monuments," p. 237. In Professor Cox's Collection, is a specimen, found near Indianapolis, of a beautifully banded slate, which is similar in outline to No. 4 of their illustrations. The material in both the illustrations which I have given, is of the same character. This silicious slate seems to have been highly-prized by the Mound-builders. Its uniform grain, its ribbon-like structure, and the ease with which it could be chipped and ground into symmetrical forms, proved a most attractive material, and we find this class of utensils distributed over nearly the whole area of the Mississippi Valley, and even the Atlantic Coast.

Weights?—Another class of implements which may have been used in the process of weaving, is represented in the following

FIG. 31 = ⅔.



a *b* *c*

Weights (?) to keep the thread taut.

Specimen *a* is from Quincy, Illinois, and is in the cabinet of Professor Worthen. It was found in connection with several others, in digging a post-hole.

Specimen *b* was found near Newport, Indiana, and is in the cabinet of Mr. John Collet, who states that in the vicinity where found, there are numerous mounds.

Specimen *c* is as interesting perhaps as any in this group, as it has been chipped out preparatory to grinding and polishing. It is in the State Collection of Illinois. The material of all these specimens is specular iron ore, from the Iron Mountain of Missouri.

To what use were these implements, upon which the Mound-builder expended so much labor and skill, applied? The popular idea is that they were plumb-bobs or sinkers to fishing-nets. With regard to the first supposition, it may be said that they would have made the attachment at the obtuse end so as to enable the observer to fix his point with greater accuracy,—a consideration which would not have been overlooked by the Mound-builder, had he employed this instru-

ment for determining terrestrial gravity, and the attachment of a string to the crease would tend to throw the plumb-bob out of perpendicular. With regard to the second supposition, it may be said that the crease is fitted to receive only a very small string, and that the Mound-builders would hardly use so costly an implement, when an ordinary pebble would answer just as well. The danger of entanglement and the consequent loss would be too great to be incurred. As personal ornaments they would be too cumbersome. I am inclined, on the whole, to believe that they were used to keep the thread taut in weaving, or to pass it through the warp. The creases are too small to admit of the attachment of a thread, except of delicate proportions.

Another use to which these implements may have been applied is that of the *bolas*, a weapon almost peculiar to the Patagonians, which according to Falkner, is of three sorts. "That used in war is a single rounded stone or ball of hardened clay, weighing about a pound, and fastened to a short rope or sinew of skin. This they sometimes throw at their adversary, rope and all, but generally they prefer to strike at his head with it. For hunting, they use two similar stones fastened together by a rope which is generally three or four yards long. One of the stones they take in their hand, and then whirling the other round their head, throw both at the object they wish to entangle. Sometimes several balls are used, but two appear to be the usual number. They do not try to strike their victim with the balls themselves, but with the rope, and then of course the balls swing round in different directions, and the thongs become so 'laid up' or twisted, that struggling only makes the captive more secure. It is said that a man

on horseback can use the bolas effectually at a distance of eighty yards." *

Carver, in his Travels, 1776, says: "The Indians that inhabit still further to the westward, a country which extends to the South Sea, use in fight a warlike instrument which is very uncommon. Having a great plenty of horses, they always attack their enemies on horseback, and encumber themselves with no other weapon than a stone of middling size, curiously wrought, which they fasten to a string, about a yard and a half long, to their right arms, a little above the elbow. These stones they conveniently carry in their hands, till they reach their enemies, and then swinging them with great dexterity, as they ride full speed, never fail of doing execution." †

In another work ‡ I have described and figured eight of these relics, collected all the way from Northern Ohio to the Mississippi River. The Ohio specimen is of a grey sub-crystalline limestone and tapers equally towards both extremities. Five of them have the same general shape as figure *a*, and with one exception, all are creased at the sharp end. They are symetrically wrought and beautifully polished, and in some of them at the small end is to be seen a slight hole, as though the block, after having been chipped to the general shape, had been secured in a lathe, and received its ultimate fashioning and polishing while subjected to a revolving motion. In Mr. Perkins's Collection is one of dark porphyry—a black base with large crystals of feldspar interspersed. The contrast of colors makes it a very beautiful object.

* Cited by Lubbock, "Pre-historic Times," p. 334.

† Carver's "Travels in North America," p. 188.

‡ "Transactions Chicago Academy of Sciences," vol. i, part ii, p. 258.

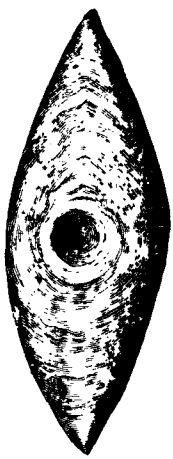
It is difficult to conceive how, in the absence of steel tools, so obdurate a material could be so symmetrically wrought. There are two of these specimens of specular iron in the State Collection of Illinois, the localities of which are unknown; three in the possession of Professor Worthen, the State Geologist; one in the possession of Mr. John Collett of Eugene, Indiana; one in the Collection of Professor Cox; one in the Iowa Institute at Dubuque; and one in the Museum of the Chicago Academy of Sciences.

There can be no doubt as to the source from which the material was derived. It is well-known that on the shores of Lake Superior and in Southeastern Missouri, occur mountain masses of specular iron. It is highly compact in structure, of a steel-gray color, and takes a good polish, with a metallic lustre. At both localities, this ore often contains imbedded crystals of feldspar, decomposing into kaolin. This peculiarity is seen in many specimens, and as the greater number were found within one hundred and fifty miles of the Iron Mountain of Missouri, the probability is that they were derived from that source, rather than from Lake Superior.

Sometimes these implements are worked out of a brown hæmatite, and are highly polished.

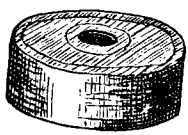
Another implement which may have been used for a shuttle, is represented in the margin, and was found in a ploughed field, near Stanford, Monroe County, Indiana, and is in the

FIG. 32 = ¼.



Weaver's shuttle.

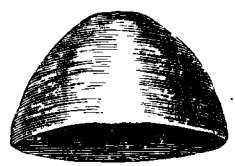
FIG. 33 = ½.



Button for the head of a spindle?

possession of Mr. Fellows, of Bloomington. It is very symmetrically wrought, and the hole shows by its creases that the rimming instrument had an irregular bit, such as would be presented by a chert edge. The next figure, I am disposed to think, is a button which formed the head of a spindle. It is of hæmatitic iron ore, and is in the cabinet of the Iowa Institute, Dubuque.

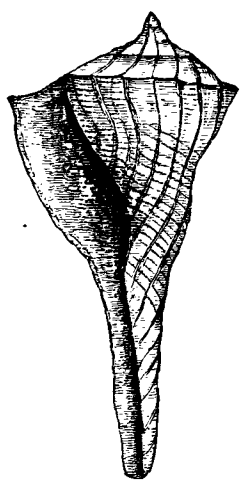
FIG. 34 = ⅔.



From the Wabash Valley.

This figure represents a hemispherical implement of brown hæmatite highly polished. It is not a perfect half-globe, there being slight irregularities. It is in Mr. Collett's Collection, and was found in the Wabash Valley, near Eugene. I have no suggestions to offer as to its applications.

FIG. 35.

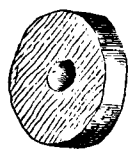


Busycon perversum (greatly reduced).

Shell-work.— The Mound-builders made use, principally, of two kinds of marine shells: the *Busycon* and the *Marginella*, but the *Olivia* and *Fasciolaria* are occasionally met with, all of which are inhabitants of the Gulf of Mexico. Of the *Busycon*, two species were employed: the *B. perversum* and the *B. carica*, but the former was the more highly prized, as it yielded plates of considerable size and thickness. These

plates were worked into rounded forms, pierced in the centre, strung, and worn as beads — the *ivory* beads so often described as occurring in the mounds. Such specimens were found in the great Grave Creek Mound, in West Virginia; in the ancient ossuary near Beverly, in the Dominion of Canada; and in the great mound at St. Louis. According to Mr. James M. Loring, who witnessed the progress of excavation in the last-named structure, at the depth of twenty-five feet lay the form of a recumbent warrior, around whose head and neck had evidently been strung a great number of beads, consisting of discs cut from a thick-plated shell, and small sea-shells entire. Through the kindness of Dr. Wm. H. Boyd, I was furnished with samples of these shells. The discs were cut from plates of the *Busycon perversum*, whilst the small sea-shells proved to be the *Marginella apicina*, which were pierced near the shoulder for the reception of a string.

FIG. 36.



Bead from the St. Louis mound, cut from the *Busycon*.

These species were also found at Grave Creek and at Beverly, points widely asunder, which indicate the close commercial relations which must have been maintained during the Mound-building epoch.

FIG. 37.



Marginella apicina.

The *Olivia porphyra* was prepared for stringing by grinding down its short spire. The columella of the *Busycon*, often six inches in length, was wrought into a pin-shaped instrument with a hemispherical head, an inch and a quarter in diameter, and the shaft half an inch, with a somewhat blunted point. The most expanded portion of the shell was cut into plates, on which were engraved various devices.

One large shell yielded a plate six by eight inches. Dr. Jones, in the "American Naturalist," was the first to describe these engraved plates, found by him in the mounds of Tennessee. Professor Wyman describes similar plates, taken by Mr. Dunning from the Lick Creek Mound, in the same State.

"They are mostly perforated with two holes, apparently for strings, but in some, they are surrounded by circles, representing eyes; between these there is a raised ridge in place of a nose, and below this a third hole which, in some of the pieces, is surrounded by a raised portion, which takes the place of a mouth. . . These objects were apparently worn as gorgets." *

Pottery. — In the plastic arts, the Mound-builders attained a perfection far in advance of any samples which have been found characteristic of the Stone, and even the Bronze Age of Europe. We can readily conceive that, in the absence of metallic vessels, pottery would be employed as a substitute, and the potter's art would be held in the highest esteem. From making useful forms, it would be but natural to advance to the ornamental. Sir John Lubbock remarks that "few of the British sepulchral urns, belonging to the ante-Roman times, have upon them any curved lines. Representations of animals and plants are also almost entirely wanting. They are even absent from all articles belonging to the Bronze Age in Switzerland, and I might almost say in Western Europe generally, while ornaments of curved and spiral lines are eminently characteristic of this period. The ornamental ideas of the Stone Age, on the other hand, are confined, so far as we know, to compositions of straight lines, and the idea of a curve scarcely seems to have occurred to them. The most

* "Fifth Annual Report Peabody Museum of Archæology."

elegant ornaments on their vases, are impressions made by the finger nail, or by a cord wound round the soft clay." *

The commonest forms of the Mound-builders' pottery represent kettles, cups, water-jugs, pipes, vases, sepulchral urns, etc. Not content with plain surfaces, they frequently ornamented those surfaces with curved lines and fret-work. They even went farther, and moulded images of birds, quadrupeds, and of the human form. The clay, except for their ordinary kettles, where coarse gravel was often intermixed, is finely-tempered, so that it did not warp or crack in baking,—the utensil when completed having a yellowish or greyish tint. Most of their pottery is unglazed, but I have seen specimens from Louisiana, which had this peculiarity, corresponding, in this respect, with the pottery of Yucatan.

FIG. 38 = $\frac{1}{3}$.



Water-coolers from Perry County, Missouri.

Water-jugs.—I present above forms of these utensils. These, being unglazed, would permit water to permeate slowly through them and evaporate, creating a temperature far below that of the surrounding air,—a device adopted at this day in tropical countries to keep water

* "Pre-historic Times," p. 257.

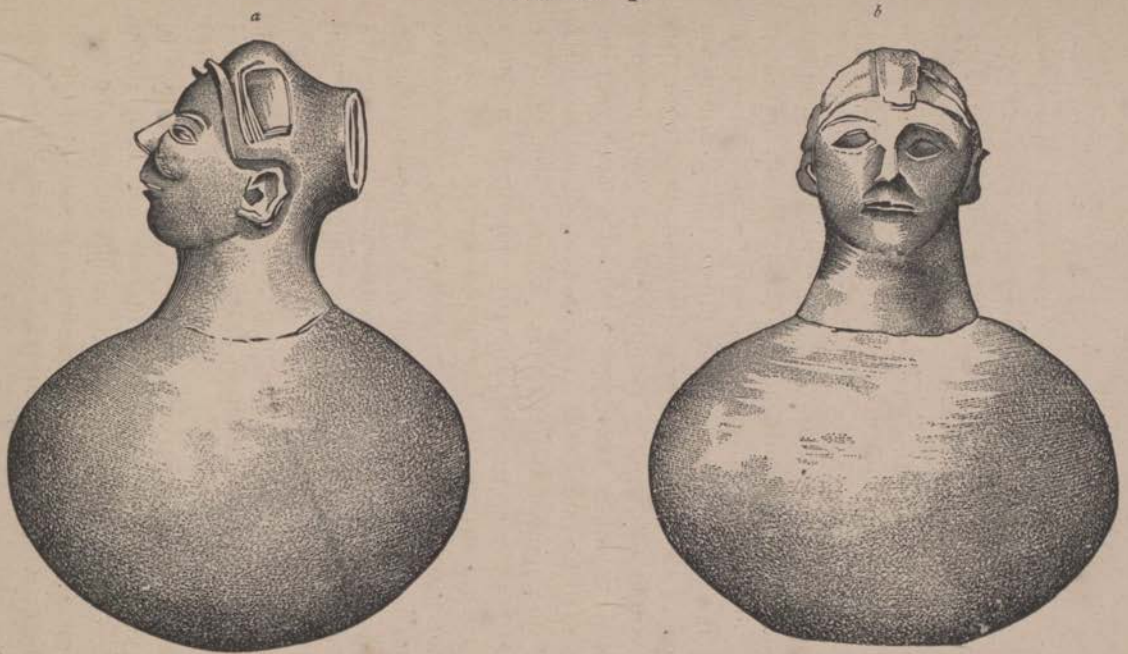
cool. The first forms represented, are similar in shape to the decanters which used to be furnished the guests of a hotel before the days of water-works. They were taken from the ancient cemetery, in Perry County, Missouri, and had been placed at the head of a corpse. (Height, eight inches.)

There are barbaric races so utterly degraded as to be incapable of availing themselves of the commonest materials about them to aid in the processes of preparing and cooking their food. The Indians of the Lake region, as shown by the testimony of the Jesuit missionary Dablon, hereinafter quoted, were accustomed to cook their food by making a pail of birch-bark, folded up so as to retain water, and casting therein heated stones until the liquid was brought to the boiling point. To make use of hollow vessels rudely-moulded of clay, implies a considerable advance in art, and a still greater advance when a people could make use of such symmetrical forms as are exhibited in the above figure. A still higher advance in art is implied, when a people, discarding simply useful forms, boldly launch out into artistic designs, such as the scroll, the indentation, and above all the portrayal of the human features, not as uncouth caricatures, but as veritable delineations of individuals in actual life.

Such delineations would indicate the setting apart of a special body of artists who, not content to model useful forms, aspired to represent human figures having the physiognomy of their race.

In the subjoined figure these suggestions are supposed to be carried out. (Fig. 39.)

FIG. 39—½.



WATER-JUGS FROM NEAR BELMONT, MISSOURI.

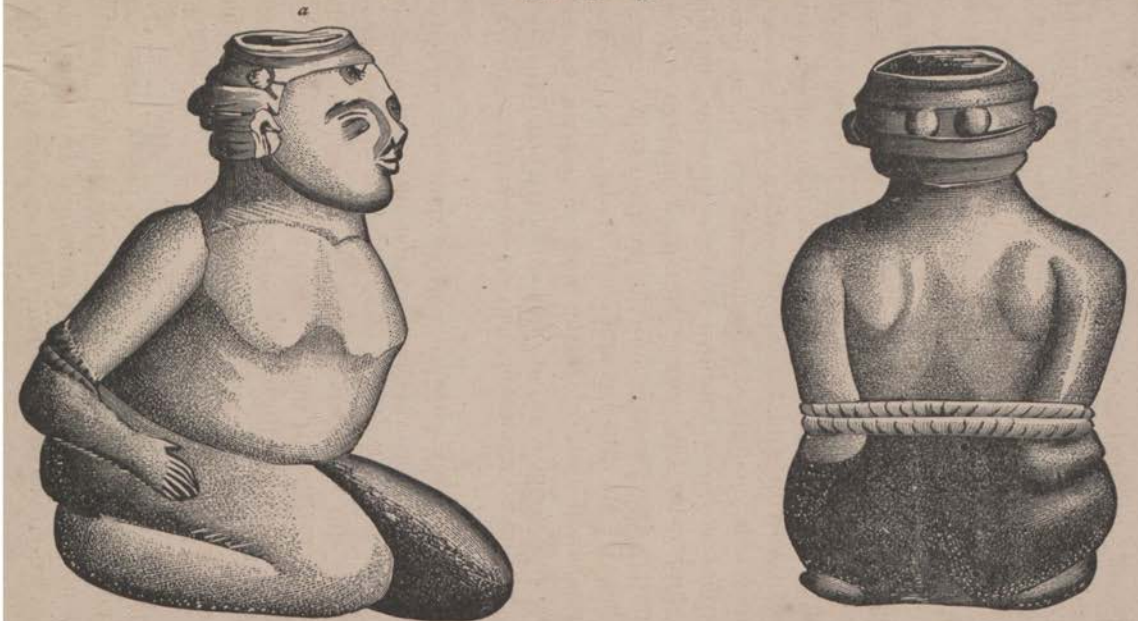
The body consists of a compressed globe, with a neck surmounted by a human head. The orifice is in the occipital region, and is about an inch in diameter. The entire vessel is about eight and one-half inches high.

When we critically examine the head, we are convinced that the unknown artist had the skill to impress upon the plastic clay the features of his race. Those features are not characteristic of the Indian. The facial angle is one indicating intelligence; the lips are not prominent; the eyes have not the obliquity of the Red man; the jaws are not prognathous; and the contour of the face is such as distinguishes the enlightened races.

It is generally supposed that the moulding of pottery, among barbaric tribes, is left to the women, and that therefore we are to look only for crude delineations which do not display the highest range of art which may have prevailed among such tribes; but I think, from the examples submitted, that the modelling of particular utensils, such as drinking cups, statuettes, funeral vases, etc., was confided to skilled artists, who impressed upon the plastic clay an individuality which is not to be confounded with mere general forms. Society had so far advanced among the Mound-builders as to give origin to a well-marked division between the artizan and the artist; or rather the latter, combining the two occupations, sought to give expression to his ideas in forms of decorative art.

On the next page is given a rear and side view of a human figure in the form of a statuette (Fig. 40). While the anatomy of the spine and shoulder-blades is well enough represented, the other parts are grossly incongruous.

FIG. 40—½.



STATUETTE FROM NEAR BELMONT, MISSOURI.

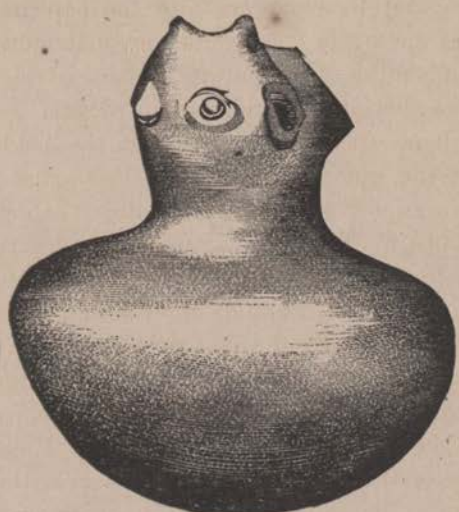
Fig. 40 represents a captive. His head is covered with several plaits of cloth; his eyes are closed; his features are contorted as with pain; and his arms are pinioned by twisted bands athwart the back, so tightly as to bring out the muscles of his shoulders. The lower portion of the body is crudely moulded, and the legs are unnaturally bent beneath. This figure may have been designed to commemorate the capture of some dangerous enemy or some notorious malefactor; and as the Mound-builders offered up human sacrifices, it may represent a victim prepared for the altar.

There is an opening at the top of the head, and the marks of the gouge with which the artist extracted some of the superfluous clay, are plainly visible. (Height, eight inches.) The two figures last described were exhumed by the late Sylvester Sexton, of Chicago, from one of a group of low mounds in Mississippi County, Mo., about seven miles from the battle-ground of Belmont. There was also found a plain water-jug, similar in form and capacity to Fig. 35. Statuettes have also been found in the ancient cemetery in Perry County, Missouri, where they occupied a position near the head of the corpse. They are gross and incongruous, infinitely beneath the figures above given, in artistic skill.

About twenty miles above the mouth of the Wabash River, on the Indiana shore, is a high bluff, where there is situated an ancient cemetery, in which great quantities of human relics have been unearthed by the excavating power of the river. Among these may be enumerated bones, ash-heaps, stone-axes, arrow-heads, pipes, and vessels of pottery. At a point still further south was recovered a water-jug which, in its general form and adaptation, is similar to those from Missouri. The body and neck are similarly-

shaped, the orifice in both examples is in the back of the head, but the head itself, instead of being human, is part human and part owl-like,— an incongruous combination. The following is a representation.

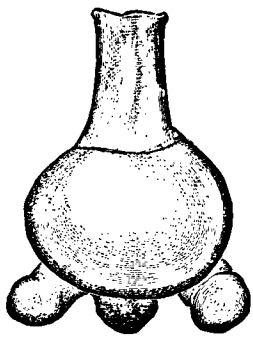
FIG. 41—½.



Water-jug found near the mouth of the Wabash, by David Septer, and presented to Prof. Cox, by Dr. J. W. Berry.

It is difficult to determine precisely what the artist designed to represent, but the nearest approach, among the feathered tribe, would be the horned owl. The eyes are large and circular, the beak is short and divided, the head is crowned by two projections which might be taken for tufts of feathers, and yet on the cheeks there is the appendage of human ears which are pierced for the reception of ornaments.

FIG. 42=¼.



Water-jug from near Belmont, Missouri.

It is not often that we meet with vessels supported by legs, yet a few such instances occur. Below I give a representation of one belonging to this class, which was found in a ploughed field near Belmont, Missouri, by William J. Hough, of Paducah, Ky., and kindly loaned by the present owner, David Hough, of Indianapolis, for this illustration. This feature is common in the ancient pottery of Mexico and Central America.

For the purposes of comparison, I introduce an illustration of a vessel from San José, near Mexico, one of the Scammon Collection of Ancient Pottery, belonging to the Chicago Academy of Sciences. It is very symmetrically moulded, and is ornamented by a series of *chevrons* or small triangles. This chevron mode of ornamentation appears to have been widely prevalent. The most beautiful specimen of pre-historic pottery that I have ever seen, was a cup recovered from the shell-banks of Grand Lake, Louisiana, by Dr. Dungan, of Jeaneret's, and deposited in

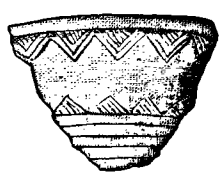
FIG. 43=½.



Ancient vessel from San José, near Mexico.

the Collection of the Chicago Academy of Sciences, but unfortunately destroyed in the great conflagration of the 8th of October, 1871. It was hemispherical in shape, and ornamented about the rim with the same chevrons seen in the above-described specimen, but with the further addition, that below the line of demarkation there was a scroll-like border. What was remarkable, however, was this; that the surface was uniformly glazed — the only instance hitherto observed by me,— and the general tint was of an umber color. In the accuracy of detail, it reminded me of the best specimens of Japanese pottery of the present day. From this similarity in the markings between the pottery from Louisiana and Mexico, an argument might be drawn, showing affinities between the two people; but when we come to enlarge our sphere of observation, we find that other people, widely-separated, adopted the same style of marking. In illustration of this fact, I introduce the following figure of pottery belonging to the Bronze Age of Switzerland, being a reproduction of Fig. 25 *a*, given by M. Desor, in his paper on the Palafittes of Lake Neuchatel. The chevrons with which it is decorated are almost identical with those above described.

FIG. 44=½.



Pottery of the Bronze Age, Switzerland.

Drinking cups.— These relics often display much taste in form and ornamentation. I give a representation of one obtained from the ancient cemetery in Perry County, Missouri, before referred to.

FIG. 45 = ¼.



Drinking cup from Perry County, Missouri. (Collection of the Chicago Academy of Sciences.)

There is a flat lip attached to the rim, and the handle is surmounted by a female head. In the occipital region there is a small orifice, leading to a larger cavity, which was found to be filled with pellets about the size of pills. This is one of the most beautiful specimens of antique pottery that I have ever seen. The clay was properly tempered; it is moulded as evenly as though turned on a potter's lathe; its form is graceful, and the face is far from being a caricature.

FIG. 46.



Pipe from a mound near Laporte, Indiana.

Pipes.—Under this head I give but a single example, and that because it affords us the features of the female countenance, modelled with some artistic skill. We have, in this

figure, the narrow and receding forehead and the broad cheeks, caused by the outward curving of the zygomatic arches, seen in the Mound-builders' skulls. The posterior parts are carried out in detail, making this the only obscene figure I have seen in the Mound-builders' art.

FIG. 47 = ¼.



Sepulchral urn from Laporte, Indiana.

Sepulchral urns.—I give three representations of sepulchral urns, taken from the mounds at Laporte, by Dr. Higday. The first (Fig. 47) is of finely-tempered clay, and is symmetrically moulded.

FIG. 48 = ¼.



Sepulchral urns from Laporte, Indiana.

The other two are of a coarse texture, and are by no means comparable, in the artistic skill displayed, to

the pottery from Missouri. The ornamentation was accomplished by indenting the clay when in a plastic state, using a sharp-pointed instrument for the curved lines and a square-pointed instrument to stamp the indentations.

Appended is a representation of a vessel from an ancient grave near the mouth of Big Sandy River, in Greenup County, Kentucky, in which the ornamentation differs from that of all the specimens heretofore represented. The body is corrugated by a series of irregular lines, which assume a nearly vertical direction, and what is rare, there are two handles attached.

FIG. 49=¼.



Vessel from Greenup County, Ky. (Prof. Cox's Collection.)

Kettles.—On the Saline River, Gallatin County, Illinois, according to the MS. notes of Professor Cox, there is just above low-water mark, a salt spring which was resorted to in the earliest settlement of the country, by those of European descent, for the purpose of procuring salt by evaporating the brine. Here occur, however, numerous fragments of pottery, showing that a pre-historic people had resorted to the same spring, and for the same purpose. From the slight curvature of the fragments it is evident that the vessels were of large capacity. The material is coarse, and the general thickness of the vessel is about one-half an inch, but at the rim it is three-quarters of an inch. The exterior is marked by vertical lines of depression about half an inch apart, with bars less conspicuous and close together, sometimes at right angles, and at others

oblique. When I first saw these specimens, I was somewhat surprised that the makers should bestow so much ornamentation on vessels so coarsely made and applied to such ordinary uses, but a slight examination showed me that these figures had been impressed and not carved; or in other words, that a basket of rushes or willows had first been constructed, inside of which the clay was moulded and allowed to dry before burning.*

It is rare to meet with specimens which are decorated with colors, yet such relics are found at Merom, Indiana, in this respect resembling the pottery of the Indians west of the Rio Grande, in New Mexico, collected by Professor Cox. In both instances the fragments are marked by broad stripes of black around the rim, and

* Since this chapter was written, I have seen a paper of Mr. Charles Rau, of New York, on the aboriginal pottery of this country, in which he refers to this locality and arrives at the same conclusions as myself: "I had occasion to examine a fragment of a vessel, sent to Dr. Davis, in 1859, by Mr. George E. Sellers, who obtained it at the 'Salt Springs' near the Saline River. . . . Several acres, Mr. Sellers states, are covered with broken vessels, and heaps of clay and shells, which indicate that they were made on the spot. They present the shape of semi-globular bowls with projecting rims, and measure from thirty inches to four feet across the rim; the thickness varies from half to three-quarters of an inch. The earthenware has evidently been moulded in baskets. It is solid and heavy, and must have been tolerably well baked. The impressions on the outside are very regular and are really ornamental, proving that these aboriginal potters were also skilful basket-makers."

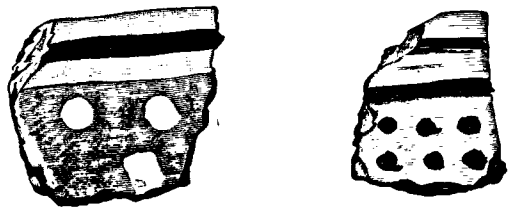
Mr. Rau quotes from Hunter, as to the aboriginal mode of making pottery. "Another method practised is to coat the inner surface of baskets, made of rushes or willows, with clay, to any required thickness, and when dried to burn them, as above described."

Breckenridge (Views of Louisiana, 1814,) states: "The Saline below St. Genevieve, Missouri, cleared out some time ago, and deepened, was found to contain wagon-loads of earthenware, some fragments bespeaking vessels as large as a barrel, and proving that the Salines had been worked before they were known to the whites."

the body is ornamented by circular spots; in the one instance the effect is produced by a dark background, while in the other the effect is produced by the reversed process.

Subjoined are representations of the two specimens.

FIG. 50.



a Ancient pottery from Merom, Indiana.
b " " " New Mexico.
(Professor Cox's Collection.)

Professor Cox was informed that the New Mexican Indians colored their pottery black by using the gum of the mezquite, which has much the appearance and properties of gum arabic, and then baking it. Much of the ancient pottery from the Colorado Chiquito is colored, the prevailing tints being white, black, and red.*

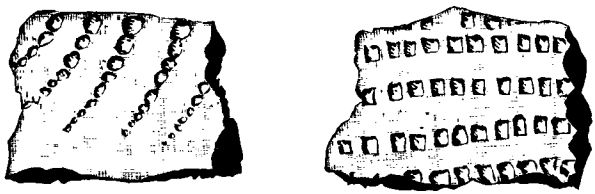
The pottery found at Aztalan, Wisconsin, is of a coarse texture, but the ornamentation is similar to that from other regions.†

* Vide "Pacific Railroad Reports," vol. iii. Whipple's "Report on the Indian Tribes," p. 48.

† Compare these figures with those given by Lubbock of ancient pottery from West Kennet, England. ("Pre-historic Times," p. 162, Fig. 154.) Also with that from New Jersey, figured by Abbot, Fig. 86, in the "American Naturalist" for April, 1872.

In the first example, the ornamentation was effected probably by a twisted band pressed into the plastic clay; and in the other example by a square implement such as was employed by the Mound-builders of Laporte.

FIG. 51.



a *b*

a and *b*. Ancient pottery from Aztalan Wisconsin.

Copper implements. — Copper-manufacture played a very important part in the domestic industry of the Mound-builders. They wrought this material into knives, chisels, axes, awls, spear and arrow-heads, and daggers, and used it in personal ornaments. It has been supposed that, unlike the pre-historic peoples of Ireland, Denmark, and Switzerland, they were ignorant of the art of reducing and casting it into the desired forms, and this opinion was based on the fact that many specimens of utensils or ornaments displayed blemishes which no hammering could eradicate, and others showed macles of silver which would not result from the smelting of two metals of so nearly equal fusibility. These specimens may have been the product of their earlier art, but I think that the evidence now in my possession, derived from an inspection of a large number of their relics, is conclusive, that in the later stages of their career moulds were employed. Many of these specimens, as I shall

show hereafter, bear marks which could never have resulted from hammering or any degree of oxidation.

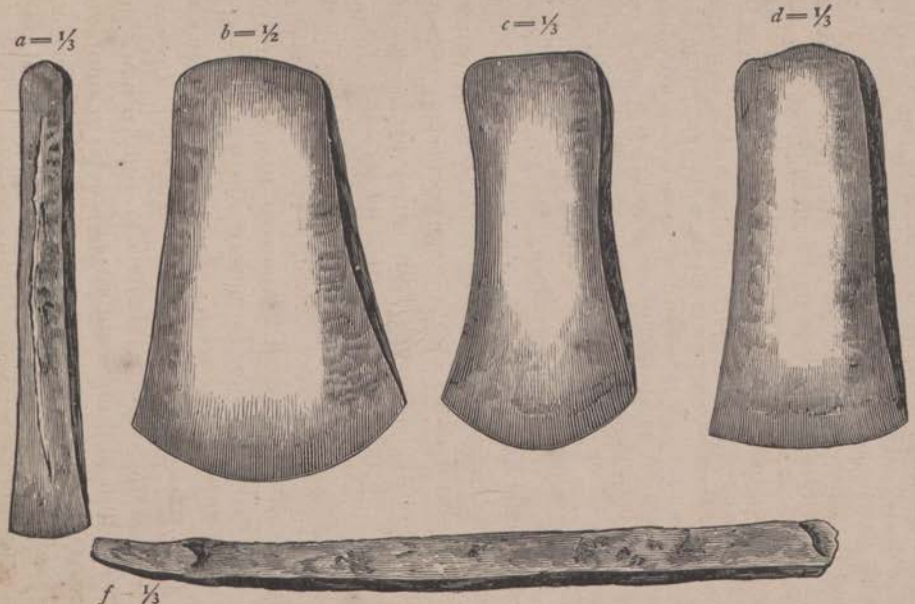
They had no tin, and therefore could not, like the ancient inhabitants of the Swiss Lakes, of Nineveh, of the Nile Valley, of Ireland, and Peru, impart to it almost the hardness of steel.* They have left behind no evidences of stone structures, built of uniform blocks and carved into ornamental forms. It is probable, therefore, that the copper implements were used only for warlike and domestic purposes. They do not appear to have known the mystery of soldering, although they had an excellent cementing material in native silver, for the ends of their bracelets are brought in contact simply by bending.

The subjoined illustrations represent in part only, the variety of forms into which the Mound-builders wrought this material. While these forms are symmetrical, there seems to have been no attempt, as among the makers of the bronze implements of Denmark and Switzerland, to resort to ornament.

* Examination has shown that in order to get the greatest hardness and cutting power in bronze, the alloy should contain about nine parts of copper to one of tin; and about this proportion is shown in the bronze instruments of Assyria, Egypt, and Ireland.

The ancient Peruvians certainly had a knowledge of bronze, obtaining their tin from Mexico and Chili. Lieutenant Gibbon (Valley of the Amazon, vol. ii.) figures a hatchet from the grave of a warrior near Cuzco, "made of copper hardened with tin," and also bronze ear-ornaments and an armlet "so thin as to spring open, when drawn over the hand," and also human effigies in the same metal. Humboldt carried with him to Europe a chisel from a silver mine opened by the Indians, not far from Cuzco, which on analysis was found to contain 94 parts of copper with 6 per cent. of tin. They executed, with bronze implements, many significant works in porphyry and granite, wrought hard veins of silver, and are supposed to have engraved the emerald.

Copper Implements. — Fig. 52.



CHISELS, AXES, AND DAGGERS.

I give above representations of the common forms of copper implements employed by the Mound-builders.

The copper chisel *a* is ten inches by one and a quarter, slightly concave on one side, while on the other it is bevelled. (Found at West Bend, Washington County, Wisconsin. Dr. Lapham's Collection.)

Copper axe *b* is semilunar on cross section, and is almost identical in form with one from Ireland, figured by Lubbock.* (From a mound near Laporte. Chicago Academy of Sciences' Collection.)

The copper axes *c d* differ somewhat in form, but agree in having flaring edges, as in the modern axe. They show no marks of use. (Found in a ploughed field ten miles north of Milwaukee, on the Green Bay Road. German Natural History Society's Collection.)

f represents a dagger or pike head, which is nearly a foot long and half an inch broad. (It was found in excavating Bloody Mound, near Neenah, Wisconsin.)

In the subjoined figure are represented several spear-heads and arrow-heads, and the mode of attachment to the shaft. This was accomplished by bending over the edges so as to form a socket at the base, and drilling a hole for the purpose of rivetting the head to the shaft. In one instance, *d*, there is a haft which was driven home in a hole made for its reception.

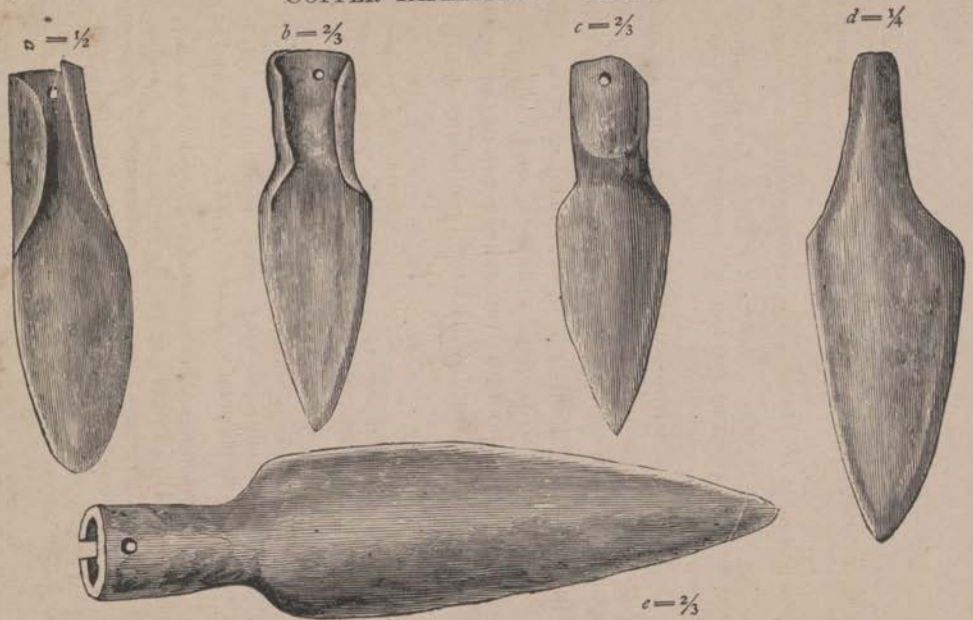
Specimen *a*, from an unknown locality is in the Collection of the German Natural History Society of Milwaukee.

Specimens *b c* are from Menasha, Wisconsin, and are in the Collection of Dr. Lapham.

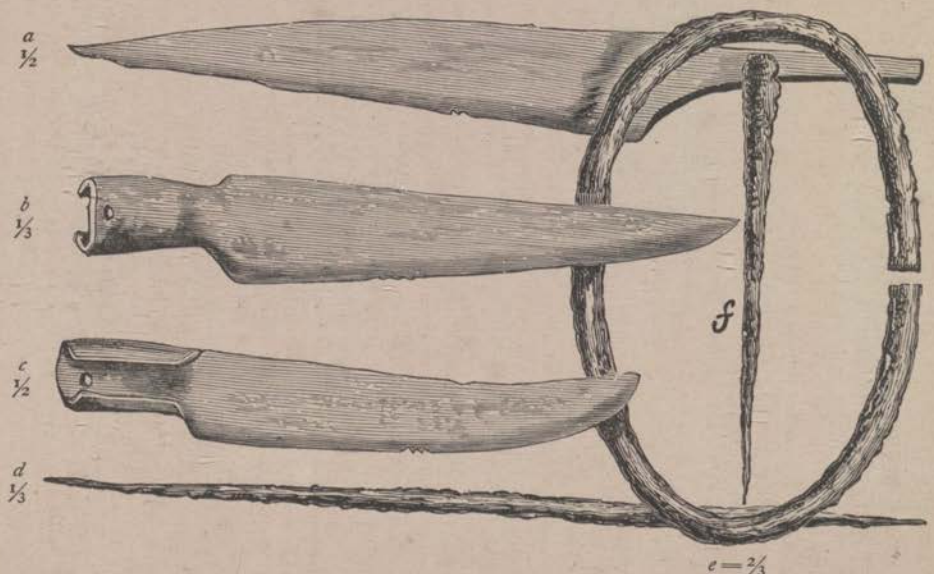
Specimens *d e* are in the Collection of the Chicago Historical Society; locality unknown.

* "Pre-historic Times," p. 25.

COPPER IMPLEMENT —FIG. 53.



COPPER IMPLEMENT. — FIG. 54.



KNIVES, AWLS, AND BRACELETS.

The copper knives show the same method of attachment as that resorted to in the spear-heads; and those found in the region of Lake Superior, among the debris of ancient mining, do not differ essentially from those found in Lower Wisconsin and Illinois.

a represents a knife in the Collection of the German Natural History Society of Milwaukee; locality unknown.

b was found near Sterling, Illinois.* The entire length of the blade is 9.5 inches: greatest breadth 1.5 inches. (Deposited in the Chicago Academy of Sciences by Rev. Dr. Burroughs.)

c is reproduced from Lapham,† and is from the Lake Superior region.

Awls have been found at points widely separated. Specimen *d* is from a mound at Laporte, Indiana; *e* was found in the interior of Wisconsin and there is one in Professor Cox's Collection, which was found in Spencer County, Indiana, adjoining, on the north, the Ohio River.

f represents a bracelet, which is not an uncommon ornament. The original was obtained by me from a mound in Charlestown, Ohio, and is one of two sets, which were found enveloped in cloth.

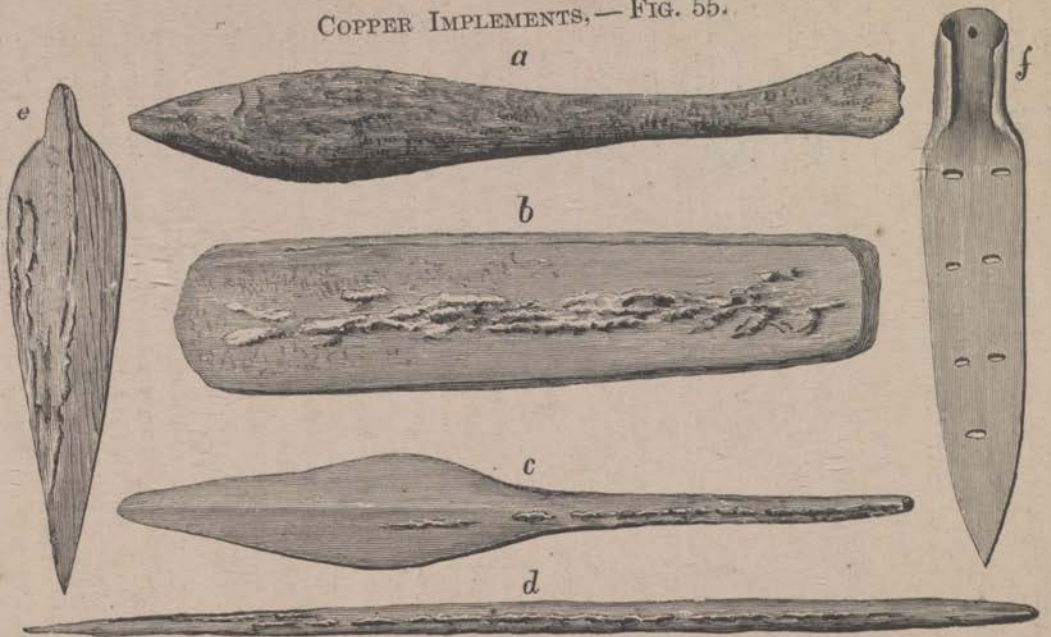
* Mr. James Shaw, Assistant Geologist of the State of Illinois, writes me thus. "The knife (above described) was in my possession for two or three months, while I was making geological examinations in that part of the State. I saw the exact place where it was found,—in a sort of river-drift, composed of black alluvium and gravel mixed, and five or six feet beneath the surface of the ground. I found the bone of a mastodon, from the fore-leg of that animal, in exactly the same formation, and at about the same depth, a few miles higher up Rock River. They both seemed to be of the same age, and in the same position. The bone was much decayed and was porous and quite light."

The observations of Mr. Shaw would assign to the copper knife a far higher antiquity than I am disposed to accord to it From the similarity in the construction of the socket to the many copper implements which I have described, and to the fact that thus far no metallic implements have been found in Europe, associated with the bones of extinct mammalia, I am disposed to refer this implement to the Mound-builder Age.

One of two suppositions is true; either that here has been an intermingling of the relics of two distinct ages; or that if the synchronism is established, man on this continent, as contemporary with the mastodon, was far in advance, in the mechanical arts, of man as the contemporary of the fossil elephant, on the European continent.

† "Antiquities of Wisconsin," p. 77.

COPPER IMPLEMENTS,—FIG. 55.



SHOWING TRACES OF MOULDS.

a represents a dagger, ten inches long and one inch wide where broadest. The flat surface is corrugated, and on each side there is a continuous ridge for a considerable distance, as if left by the imperfect junction of the two parts of the flask. (Locality, Waukesha, Wis.)

b is a chisel, seven inches long, one and a fourth inches broad at widest point, and a little more than a quarter of an inch thick. Both of the broad surfaces are roughly ridged, and the sides show the marks of a mould. (Locality, Waterford, Wisconsin.)

c is a spear-head, with a haft for insertion into a handle. Length, nine inches; breadth, at the widest part, one and an eighth inch. The general surface is quite smooth, showing little corrosion. On either side there is a sharp ridge, which I think clearly indicates the marks left by the mould. (Locality, Trenton, Wisconsin.)

d is an awl sixteen inches long, and three-eighths of an inch in its greatest diameter. It is traversed longitudinally by three thin ridges, such as would be left by a sand-mould now in use. Mr. Perkins had another specimen, similar in design, three feet long, and nearly an inch in its greatest diameter, which was unfortunately lost. (Locality, Barton, Wisconsin.)

e is a symmetrical spear-head, four and a half inches long. The surface displays a set of delicate longitudinal lines, with the marks of the mould strongly ridged on each side. (Locality, Farmington, Wis.)

f is a spear-head, with a socket, five and a quarter inches in length. The thrusting part is ground down smooth, and the socket, at the point of attachment, has the appearance of having been cast, not formed by hammering. There are seven indentations, which Mr. Perkins conjectures were, perhaps, the record of events in the life of the possessor.

Mr. Perkins, to whose archæological collections I have had occasion so often to refer, has not less than sixty copper implements, representing all the known forms, such as knives, chisels, and spear-heads, besides several anomalous forms. He had arrived at the same conclusion as myself; that by reason of certain markings, it was evident that the Mound-builders possessed the art of smelting copper, and he has furnished me with the foregoing illustrations, in which the traces of the mould are clearly defined. It is impossible to infer, after a careful examination of these specimens, that the ridges could have been left in the process of hammering, or that they have resulted from unequal oxidation.

In treating of the various implements of the Mound-builders, I have encroached, in a slight degree only, upon the materials at my command. The expense of illustration, and the necessity of bringing this work within reasonable limits, compel me to exercise, reluctantly I confess, the duty of abridgment. The more thoroughly I investigate their arts and manufactures, the stronger becomes my conviction that they were something more than a mere barbaric people.

NOTE.—A brief enumeration of some of the other forms of copper in Mr. Perkins's Collection, may not be out of place in this connection. There is a copper chisel, eight by one and a half, by one-third inches, ribbed on one side and ground on the other, and resembling in its general outlines *a*, Fig. 46. It would be difficult to conceive how such an implement could have been hammered out. The farmer who recovered it, affirmed that it was found twelve feet below the surface.

There are three chisels with flaring bits, like *d*, Fig. 49, one, eight and a half, by one half inches, three and a half inches broad at the cutting edge, and one at the head; the second, six by three inches, three and three-fourths inches broad at the cutting edge, and one and one-quarter at the head; the third is of about the same dimensions, except that it is an inch longer; another is oblong, four, by two and three-fourths inches; and another of the same form, five, by two and a half inches, which is flat on one surface and ridged on the other.

There is a pike-head, symmetrically shaped, wrought to a sharp point, and with a gradual taper towards the head, which is also sharp but bent over, as if designed as a clamp. The length of this implement is nearly eight inches, and the form or cross-section is square, the greatest diameter being one-half inch. There is another instrument of a somewhat similar character, nearly six inches long, oblong on cross-section, one-half by one-fourth inch, one side of which is grooved for two-thirds the distance, one end brought to a point, and the other bent over like a fish-hook.

There is a copper awl, of the general form of *d*, Fig. 51, but only four and three-fourths inches in length.

There are five copper knives, one very rude, of the same general form as *a*, Fig. 51, with hafts for the attachment of a handle; and one with a socket, as in *b*, *c*, Fig. 51. The blade, which is leaf-shaped, is only two and a half inches long.

The spear-heads present a variety of forms. There are two of the same general shape as *e*, Fig. 50, with sockets and holes for inserting and attaching the handle.

CHAPTER VII.

ANCIENT MINING BY THE MOUND-BUILDERS.

THE southern shore of Lake Superior for nearly one hundred and fifty miles, is bounded by alternate beds of trap and conglomerate of the Lower Silurian Age. Associated with these beds are veins of native copper, sometimes cutting this assemblage of rocks vertically, and sometimes running with the formation. Native silver, chemically pure, is often found embedded in the copper, in the form of blotches or macles, whilst the copper which serves as the paste or matrix, is lean in the precious metal. It is hardly necessary to add that native copper is not mined elsewhere in the United States, and hence its presence in the mounds, at remote points, is an infallible guide in tracing the commercial intercourse of the Mound-builders.

The two districts of Keweenaw Point and the Ontonagon, are well known at this day as the great mining centres, giving employment to a vast capital, and yielding a product in copper about equal to the national consumption.

Isle Royal, near the northern shore of the lake, in its geological structure is the counterpart of Keweenaw Point.

Copper boulders are frequently found on the lake-shore, and in the Drift as far south as Central Indiana

and Illinois; but while conjecture, half a century ago, was rife that they were derived from the rocks forming the water-shed between Lake Superior and Lake Michigan, the real character of the copper-bearing rocks and the mode of occurrence of the native metal, were not known until the year 1841, when Dr. Douglass Houghton presented a geological report upon the region to the legislature of Michigan.

The Jesuit missionaries penetrated this region as early as 1660, and whilst in their "Relations" they made frequent mention of the occurrence of loose masses of copper on the shores of the lake, and questioned their Indian *voyageurs* as to their origin, yet they were enabled to glean but scanty information as to their true source.

"It frequently happens," says Father Alloüez, "that pieces of copper are found weighing from ten to twenty pounds. I have seen several such pieces in the hands of the savages, and since they are very superstitious, they esteem them as divinities, or as presents given them to promote their happiness by the gods that dwell beneath the water. For this reason they preserve these pieces of copper wrapped up with the most precious articles. In some families they have been kept more than fifty years; in others they have been kept time out of mind, being cherished as domestic gods."

Dablon, who followed in the footsteps of Alloüez, states that the savages did not agree as to the source of the copper. Some said that it was where the river (Ontonagon) began; others that it was close to the lake in the clay; and others at the forks and along the east branch of the river. He dwells, too, on the superstitious reverence with which the Indians regarded these copper masses, and in the "Relation" for 1669-70, gives the following legend:

"We have learned from the savages some secrets which they did not want at first to communicate, so that we were obliged to use some artifice. We do not, however, vouch for everything contained in the following account.

"After entering the lake, the first place met with containing copper, is an island about forty or fifty leagues from the Saut, towards the north shore, opposite a place called Missipicooatong (Michipicoten). The savages relate that it is a floating island, being sometimes near, and at others afar off. A long time ago, four savages landed there, having lost their way in a fog with which the island is freqently invested. It was previous to their acquaintance with the French, and they knew nothing of the use of kettles and hatchets. In cooking their food, as is usual among savages, by heating stones and casting them into a birch-bark pail containing water, they found that most all of them were copper. After having completed their feast, they hastened to re-embark, for they were afraid of the lynxes and hares which here grow to the size of dogs. They took with them copper stones and plates, but had hardly left, before they heard a loud voice exclaiming in an angry tone, 'Who are the thieves that carry off the cradle and the toys of my children?' They were very much surprised at the sound, not knowing whence it came. One said it was thunder; another said it was a certain goblin called *Missibizi*, the spirit of the waters, like Neptune among the heathen; another, that it came from the *Memogovissioois*, who are marine men, living constantly under water like the tritons and sirens, having long hair reaching to the waist; and one of the savages asserted that he had certainly seen such a being. At any rate, this extraordinary voice produced such fear

that one of them died before landing. Shortly after two others died, and one alone reached home, who, after relating what had happened, also died. Since that time the savages have not dared to visit the island, or even to steer in that direction."

The good father explains this legend by supposing that they were poisoned by using the copper stones in cooking their food; that the supernatural voice was but an echo of their own; and that the vanishing and reappearing of the island were due to the fogs and haze which hang about it.

These citations show that the Indians, when first visited by the white man, had no traditions as to their ancestors having mined copper; that they had but vague ideas as to the source from which it was derived; that they regarded it as "big medicine," to be preserved as the most precious of their treasures; and that they made no use of it in the practical arts.

That the whole extent of the copper-bearing region, embracing both shores of the lake, was resorted to in remote times for mining purposes, by a race of whom the Indians preserve no tradition, there is the most abundant evidence. This evidence consists in numerous excavations in the solid rock, from which the vein-stone has been extracted; of heaps of rubble and dirt along the courses of the veins; of copper utensils fashioned into knives, chisels, and spear and arrow-heads; of stone hammers, creased for the attachment of withes; of wooden bowls for bailing water from the mines; of wooden shovels for throwing out the debris; of props and levers for raising and supporting the mass copper; and of ladders for ascending and descending the pits.

The high antiquity of this mining is inferred from these facts: That the trenches and pits were filled even

with the surrounding surface, so that their existence was not suspected until many years after the region had been thrown open to active exploration; that upon the piles of rubbish were found growing trees which differed in no degree, as to size and character, from those in the adjacent forest; and that the nature of the materials with which the pits were filled, such as a fine-washed clay enveloping half-decayed leaves, and the bones of such quadrupeds as the bear, deer, and caribou, indicated the slow accumulation of years, rather than a deposit resulting from a torrent of water.

The most extensive excavations occur in the Ontonagon region, and to Mr. Samuel O. Knapp, the former superintendent of the Minnesota Mining Company, the public are indebted for the first knowledge of their nature and extent. It was in the winter of 1847–8, while passing over a portion of the company's grounds, that he observed a continuous depression in the soil, which he rightfully conjectured was formed by the disintegration of a vein. There was a bed of snow on the surface three feet deep, but it had been so little disturbed by the wind that it conformed to the inequalities of the soil. Following up these indications, as displayed along the southern escarpment of a hill, he came to a cavern into which he crept, dispossessing several porcupines which had resorted there to hibernate. He saw numerous evidences to convince him that this was an artificial excavation, and at a subsequent day, with the assistance of two or three men, proceeded to explore it. In clearing out the rubbish, they found numerous stone hammers, showing plainly that they were the mining implements of a rude race. At the bottom of the excavation was seen a vein with ragged projections of copper, which the ancient miners had not detached.

The following spring he explored some of the excavations farther west. One artificial depression was twenty-six feet deep, filled with clay and a matted mass of mouldering vegetable matter. When he had penetrated to the depth of eighteen feet, he came to a mass of native copper, ten feet long, three feet wide and nearly two feet thick, and weighing over six tons. On digging around the mass, it was found to rest on billets of oak, supported by sleepers of the same material. This wood, from its long exposure to moisture, was dark-colored and had lost all its consistency. It opposed no more resistance to a knife-blade than so much peat. The earth was so firmly packed as to support the mass of copper. The ancient miners had evidently raised it about five feet and then abandoned the work as too laborious, having first knocked off all the projecting points.

The vein was wrought in the form of an open trench, and where the copper was most abundant, there the excavations were deepest. The trench was filled nearly flush from the wash of the surrounding surface. The rubbish was thrown up in piles, which could readily be distinguished from the general contour of the ground.

A few rods further west was to be seen another excavation in a cliff, where the miners had left a portion of the vein-stone, in the form of a pillar, to prop the hanging wall.*

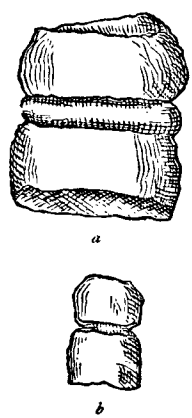
The evidences of ancient mining were to be seen on this location for the distance of two and one-half miles. Upon a mound of rubbish we saw a pine stump, the trunk having been broken fifteen feet from the ground, ten feet in circumference, which must have sprouted;

* A sketch of this mode of mining is given in Foster and Whitney's Report, 1850.

flourished, and died since the earth was thrown up. Mr. Knapp counted three hundred and ninety-five annular rings on a hemlock growing in a similar position, which he felled near one of his shafts.

The number of ancient hammers which he took from these excavations exceeded ten cart-loads, and with little reverence for the past, he employed a portion of them in walling up a spring. They were made of greenstone and porphyry boulders, which are found very abundantly at certain localities on the lake-shore. Selecting a stone of the desired size and form, the ancient miner cut a groove, single or double, around it, so that it might be secured with a withe, and thus wielded as a sledge-hammer. The accompanying figure *a* represents one of the larger class, whose dimensions are twelve, by five and a half, by four inches, and the weight is thirty-nine pounds. The smaller class, *b*, was probably wielded with one hand.

FIG. 56.



Stone hammers, used by the ancient miners in the Lake Superior region.

Mr. William H. Stevens discovered other workings in the vicinity of the Forest Mine, of nearly equal interest and extent. They occurred on the southern slope of a hill, and consisted of a series of pits, some of which were fourteen feet deep. They were arranged in four lines, following the courses of four veins or feeders. In cleaning out one of these pits the workmen came upon the remains of a wooden bowl which, it was inferred, from the splintery fragments of rock embedded in the rim, must have been employed in bailing out water.

Remnants of charcoal were found, not only there, but at other points, lying on the surface of the rock. Some have supposed that fires had been kindled for the purpose of melting the copper, but the more reasonable supposition is that the purpose was to heat the rocks, and then dash on water, and thus shatter and destroy the cohesion between the particles. This method was practised by civilized nations before the invention of gun-powder, and even at this day in the mining districts of the Hartz and Altenberg. We can hardly conceive how those old miners broke down the tough compact rocks with such implements as they have left behind, except that they resorted to the agency of fire.

In the Ontonagon region for the distance of thirty miles, such evidences abounded. Upon Keweenaw Point, they could be traced along the trap range from Eagle River for twelve miles eastward. In describing these works we have used the past tense, for the explorers of that region, when they found that these mounds and depressions had been made by a pre-historic race, were sure to upturn the soil not as a matter of scientific interest, but with the hope of finding copper veins.

Mr. C. G. Shaw pointed out to us similar workings on Isle Royal. They occur on what is known as the "Middle Finger," and can be traced for the distance of a mile. On opening one of these pits he found that it had been worked to the depth of nine feet. At the bottom was a vein of native copper eighteen inches thick, enclosing a sheet of that metal lying near the foot-wall. Hammers, similar to those before described, abounded.

Mr. S. W. Hill writes me at this time (1872), that he has found during the past season, on this island ancient pits fifty feet deep.

These facts show how extensively copper-mining was prosecuted by a pre-historic race. It may be said that there is hardly a productive vein in that region but what shows traces of its having been previously wrought.*

To connect the Copper-miners with the Mound-builders, is no difficult task. Copper wrought into various utensils, is found in the mounds all the way from Wisconsin to the Gulf Coast, and the supply is too abundant to authorize the supposition that it was derived from the boulder drift. Its wide distribution is an evidence, too, of an extensive commerce. To penetrate that distant region from the Ohio Valley, involved on the part of the Mound-builders, a voyage of a thousand miles. The passage to and fro was made in the summer season, for there is no evidence, such as mounds, village plots, or house foundations, to indicate permanent occupancy. The climate is too hyperborean to admit of the maturing of maize, and hence they must have had a well-organized commissariat, with no interruption in their lines of communication. It is true, the lakes and streams afforded an abundance of fish of the finest flavor; but man cannot thrive on a fish diet alone.

The Mound-builders carried on mining operations of a different nature, and in a region equally remote. We

*In the foregoing account of the ancient mining on Lake Superior, I have availed myself, with the occasional omission of a sentence or the substitution of a word, of a chapter prepared by Mr. Whitney and myself, and contained in our "Report on the Geology of the Lake Superior Region," Part I, published by the authority of Congress, 1850. This was the first connected account of these ancient explorations. The facts embodied in that chapter have since been appropriated by subsequent writers, and often, I regret to say, without any acknowledgement of the source from which they were derived.

have seen that mica was in great demand among them, being used probably for mirrors and personal ornaments. Two hundred and fifty plates were taken from the Grave Creek mound. Squier and Davis, from a mound near Chillicothe, extracted several "round sheets, ten inches or a foot in diameter, overlapping each other like the scales of a fish," and a plate of this material is said to have been found in a mound at Circleville, which was three feet in length, one and one-half feet in breadth, and one-half inch in thickness.

It was not until the past year that I became aware of the source from which these large plates were derived; for whilst mica is an abundantly-distributed mineral, its occurrence in large plates, suitable for use in the arts, is rare. Professor Kerr, in charge of the Geological Survey of North Carolina, informed me that he was lately called upon to examine some ancient pits in the mountainous region of that State, which were supposed to have been excavated by De Soto and his followers in search of silver, although history does not indicate that the Spanish hero took that region in his route to the Mississippi. In clearing out these pits, which were apparently of great antiquity, it became evident that the mineral sought for was mica, and there is little doubt that this work was done by the Mound-builders. These mines have been re-discovered, and under modern enterprize, the market of this country is now supplied from the same source to which the Mound-builders resorted.

Lead, although easily reduced, does not appear to have been used to any considerable extent. Mr. Woodman, of Dubuque, informed me that he detected its presence in one of the mounds in the American Bottom, and Dr. Hoy recovered from a mound in Wisconsin,

a pipe which had been fractured and subsequently mended with a ferule of the same material. The scarcity of this metal is the more singular, since the lead region of Iowa, Wisconsin, and Illinois is dotted with their works. Galena is frequently met with in the mounds as far south as the Ohio River.

The specular iron ores of Missouri, as we have seen, were wrought as a *stone* into what are ordinarily called "plumb-bobs," which are among the most beautiful of the Mound-builders' ornaments.

Very many of their implements, as has been shown, are wrought out of a greenish fine-grained and ribbon-marked silicious slate, and from their wide diffusion, it is evident that these people resorted to some special quarry for the supply. It is a rock of metamorphic origin, whose counterpart is not to be found in the Mississippi Valley, unless it be upon the rim of the basin. I am inclined to believe that it was obtained from the novaculite slates which are found on the sources of the Menomonee.

The greenstones and porphyries which are the materials of their axes, occur in place upon the water-shed of Lake Superior, but the Drift affords an abundant supply, obviating the necessity of resorting to that distant source.

The chert, associated with the limestones, was the material employed for arrow-heads, spear-heads, hoes, and spades. On what is known as "Flint Ridge," in Muskingum County, Ohio, there are numerous chippings often covered with dendritic markings which, while a strong, are not an absolutely certain proof of antiquity. The deposit is in the form of chert, often approaching chalcedony and jasper in external characters, and it afforded an admirable material for arrow-heads. From

the abundance of chippings, this locality was evidently resorted to by both the Mound-builders and the modern Indians.

> "There the ancient arrow-maker
> Made his arrow-heads of sandstone;
> Arrow-heads of chalcedony,
> Arrow-heads of flint and jasper,
> Smoothed and sharpened at the edges,
> Hard and polished, keen and costly." *

This formation, which is a member of the Coal series, can be traced almost uninterruptedly from the central portion of the State to the Ohio River, and at several points, similar evidences of arrow-head manufacture have been observed.

Chert is abundantly associated with the Silurian and Devonian limestones which underlie a great portion of the Mississippi Valley, so that the Mound-builder had not to resort to remote sources for his flaked implements.

A writer upon our ethnology, who is often quoted — Schoolcraft, — has informed us that flint implements are rarely found in our mounds. Had he been a geologist, he would have said, never. Whilst we have the Cretaceous system developed on a magnificent scale, we have not the chalk formation with its accompanying

* Sandstone was never used by the Mound-builders as a material for arrow-heads. It has not those frangible properties which admit of its being "sharpened at the edges," nor that adhesion between the particles which admits of its being "polished." Quartz fulfills these conditions; and chalcedony and jasper are but varieties of this mineral. True flint is unknown in this country, but chert approaches it very nearly. The mineralogist, therefore, would interpret this passage thus:

> "There the ancient arrow-maker
> Made his arrow-heads of quartz-rock —
> Arrow-heads of chalcedony,
> Arrow-heads of chert and jasper, —
> Smoothed and sharpened," etc.

nodules of flint; but adopting *flint* as a generic term, we have ancient spear and arrow-heads represented in quartz, chert, hornstone, jasper, chalcedony, carnelian, and in the alkaline-earthy mineral, obsidian which in its capacity to flake with a large conchoidal fracture, leaving sharp, but brittle edges, is surpassed by no other form. Squier and Davis found obsidian arrow-heads in Ohio, and Mr. Perkins has one found in Wisconsin.

Eras of human progress.—Ethnologists have divided the progress of man into three periods—the Age of Stone, when he makes use of the crudest and simplest instruments to provide the means of subsistence, and when he is purely a barbarian; the Age of Bronze, which implies a marked improvement in his social condition; and the Age of Iron, which is manifest in his mastery over the forces of nature, and in the attainment of the highest civilization.

It would be presumptious to infer that the successive ages known as Stone, Bronze, and Iron, like certain geological epochs, were synchronous the world over. A rude people, cut off from intercourse with surrounding nations, and therefore incapable of adopting the prevailing knowledge in arts and inventions, would make slow progress in civilization. At this day, on many of the isles of the Pacific, and in the mountainous region of our own country, are living tribes whose weapons of warfare and the chase, the archæologist, without knowing their history, would refer to the Stone Age. Whilst the primitive condition of man, perhaps, was that of a barbarian, and the natural state of society that of warfare, yet the emergence from this state, as shown by all history, among the different tribes of the human family, has been unequal, and few have

attained, at this day even, to a high scientific and moral enlightenment.

In reviewing the arts and manufactures of the Mound-builders, as set forth in the preceding pages,—the vast number and magnitude of their structures, their skill in weaving, in pottery, in fabricating stone implements, the extent to which they substituted copper in the place of bronze, and the wide range of their commercial intercourse, implied in bringing together the products of distant regions, such as the native copper of Lake Superior, the specular iron ores of Missouri, the mica of North Carolina, the shells of the Gulf Coast, and the obsidian of Mexico, we are justified in assigning to them a place in the scale of civilization as high as that of the Bronze Age of the eastern hemisphere.

Their exclusion from the beautiful valley of the Mississippi, which contains so many memorials of their industry and greatness, is not the only example which history affords of the extermination of a people considerably advanced in civilization, by a people more vigorous and less inclined to the arts of peace.

CHAPTER VIII.

CRANIA OF THE MOUND-BUILDERS.

WHILE the individual variations in the crania of a particular race are so great as to present intermediate gradations all the way from one extreme to another, thus forming a connecting link between widely-separated races, yet, in a large assemblage of skulls derived from a particular race, there is a general conformation, a predominant type, which appears to have been constant as far back as human records extend; to have been unaffected by food, climate, or personal pursuits; and which has been regarded among the the surest guides in tracing national affinities. Hitherto, our knowledge of the Mound-builders' crania has been exceedingly scant — restricted to less than a dozen specimens — which, if authentic, clearly indicate for the most part the Indian type. The results of my observations have led me to infer that the Mound-builders' crania were characterized by a general conformation of parts, which clearly separated them from the existing races of man, and particularly from the Indians of North America.

I propose to discuss these distinctive characters, based on crania derived from points somewhat widely asunder.

1. *From the region of Chicago, Illinois.*
2. *From the region of Merom, Indiana.*
3. *From the region of Dubuque, Iowa.*

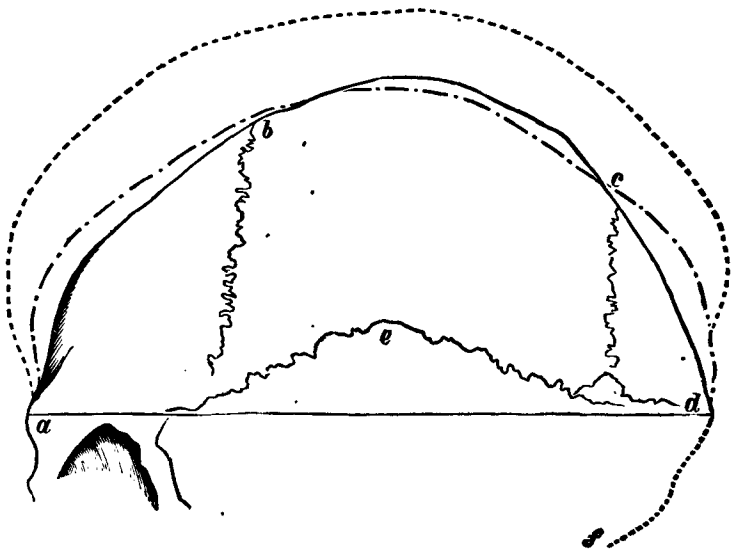
The similarity of type in these crania, apart from the similarity in weapons of warfare, pottery, personal ornaments, and earthworks, would indicate a homogeneous people distributed over a wide area.

1. *From the region of Chicago.* — A portion of the crania described in this chapter were collected from two groups of low mounds about five miles apart, situated on the banks of the Des Plaines River. Dr. Stimpson, now deceased, but whose memory will be honored by every cultivator of science in this country, was first attracted to one of these groups by observing circular trenches investing knolls two and one-half feet above the surrounding plain, which led him to believe that they were artificial, and, under his direction, Mr. Charles Kennicott, assisted by Dr. Durham, entered upon their exploration. There were portions of eleven skeletons found in the first group, but they were so far decayed that only one skull and three frontal bones, sufficiently well preserved to admit of measurement and comparison, were obtained.

The other group of mounds, situated near Haas's Park, yielded human remains which evidently belonged to two distinct epochs. In them were found well-marked Indian skulls, in a condition slightly changed, and two skulls, evidently belonging to Half-breeds,— thus showing that up to a comparatively recent time, these mounds had been used as places of sepulture by different races. In addition to these evidences of recent entombment, were found, far gone in decomposition, quite a number of crania, presenting features which readily distinguished them from those of the Indian

and Half-breed. These relics have a high value, as without doubt, they are the authentic skulls of the Mound-builders.

FIG. 57 = ½.



Skull from Stimpson's Mound.*

a Superciliary ridge and glabella.
b Coronal suture.
c Apex of lambdoidal suture.
d Occipital protruberance.
e Squamosal suture.
f Position of the foramen magnum. †

The best preserved skull belonging to this pre-historic race was taken from what is called "Stimpson's Mound,"

* The dotted line inside shows the contour of the Australian skull — the lowest of existing races; the outer dotted line that of the European — the highest.

† As these points, in the subsequent illustrations, will bear the same letters, the names will not be repeated.

one of the group first described. The gelatinous matter had been dissolved away, and the bony matter, as saturated with moisture, presented a soft spongy mass, exceedingly fragile, which when dried, readily adhered to the tongue. The soil was not unfavorable to the preservation of human remains, being a fine loam which, when packed, resisted the leaching of the waters. To these remains, then, we may assign a very considerable antiquity.

This skull is imperfect, the left parietal being wanting, and also the base, and therefore will not be the subject of minute description. There are, however, a few general points displayed, which will be found characteristic to a greater or less degree of the crania subsequently represented, to which I would direct attention.

1. The low development, both in the anterior and posterior regions at the apex of the coronal (*b*) and that of the lambdoidal suture (*c*), as well as the low frontal eminences, whereby the form of the *Gothic arch* is given to the profile view.

2. The obliquity of the line which starts from behind the foramen magnum, and runs to the occipital crest (*d*).

3. The tendency at the union between the parietal and squamous bone (*e*) towards a straight line.

4. The occipital point as forming the posterior extremity of the skull.

5. The projection of the nasal bones beyond the general outline of the skull.

6. The vertical parietal walls, the deeply-notched orbital processes, and the bulging out of the zygomatic arches (not represented in the figure) in an extraordinary degree, as compared with the European skull.

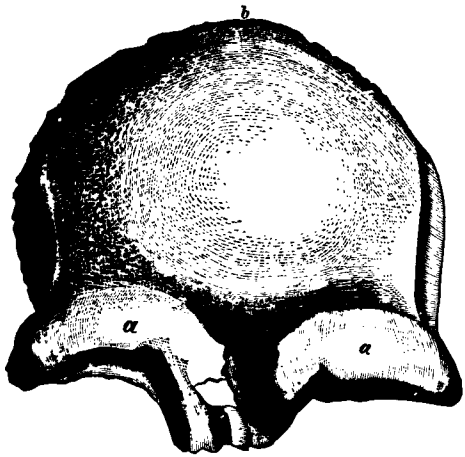
Many of these characteristics, which are not conspicuous in a well-developed European skull, indicate an approach towards the lower animals of the anthropoid type; but still, between the lowest form of the one and the highest form of the other, there is a broad chasm which cannot be spanned by intermediate gradations.

The measurements of this skull will be given in a tabulated form. In its general outline it is Orthocephalic. In brain capacity, it is about that of the Borreby skull of Denmark — figured by Huxley — which is referred to the Stone age; — a time just succeeding the last great physical changes in Europe, and when man was the contemporary of the Urus and Bison, but not of the Hairy Elephant and Rhinoceros. This Danish skull, with the exception of the famous Neanderthal skull, is of the lowest conformation yet observed in Europe, and when compared with the Stimpson skull, there will be found a striking parallellism in their general outlines,—the latter rising a little higher at the vertex, and receding a little in the region of the superciliary ridges, and at the base in the line of *d f*. While other Danish skulls of the Stone Age exhibit a higher development, other Mound-builders' skulls, as I shall show, are more depressed.

The "Kennicott Mound" yielded three frontal bones — the only parts of the skeleton capable of preservation — which were also indicative of a low type. In two instances there was a rapid narrowing in the temporal region; the plates were extraordinarily thick: the superciliary ridges were massive, standing out like ropes; the orbital processes were profoundly notched; and the frontal bone was much prolonged towards the coronal suture. Fig. 58, reduced one-half, represents

one of these bones. No one, I think, can view this fragment of a skull, with the superciliary ridges projecting far beyond the general contour, both laterally and in front, and the low, flat forehead, with its thick, bony walls, without coming to the conclusion that its possessor was a ferocious brute. The prize-fighter of this day might envy such a frontispiece, adapted to withstand any amount of pommelling, or almost even to turn a musket ball.

FIG. 58.



Frontal portion of a skull from "Kennicott's Mound," near Chicago.

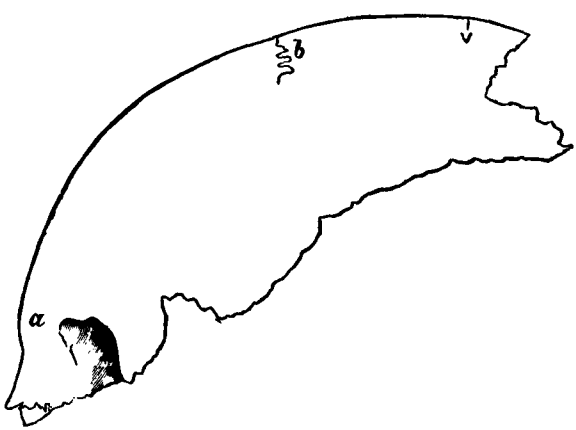
a, *a*, Superciliary ridges. *b*, Coronal suture.

The Haas's Park mounds yielded two crania which were too imperfect to give all the salient points. One is represented by a part of the frontal and parietal bone, and is characterized by an almost entire absence of a forehead. The nasal bones are prolonged from the point of union with the frontal bones, like the beak of a bird or the superior jaw of a gar-pike. The bony

plates are of almost pasteboard thinness; the orbital rings are sharp and delicate; the sutures are imperfectly joined; and there is an absence of frontal sinuses, which are supposed to be formed only after puberty,—so that the skull evidently belonged to a young person.

This is, undoubtedly, the most remarkable skull hitherto observed, affording the nearest approximation to the anthropoid forms. It is so far anomalous that I shall hereafter omit to compare it with existing types. Granting all of the effects of pressure, whether artificially applied or the result of superincumbent earth after burial, still, it is difficult to bring it within the reasonable bounds of conjecture as to our ideas of the conformation of what a human cranium, in its widest deviation from a supposed type ought to be.

FIG. 59=½.



Child's skull, from Haas's Park.

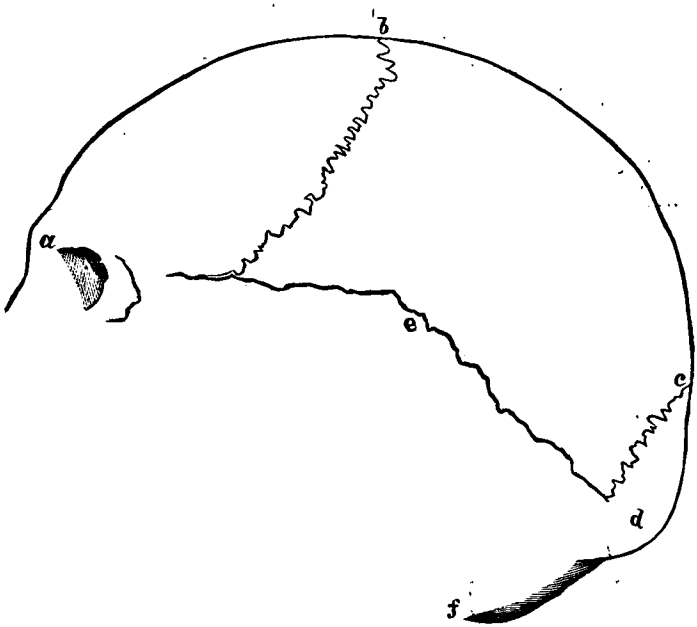
a Glabella. *v* Vertex.

There was another skull, fragmentary in character, having about the same contour as that from the "Stimp-

son Mound," which I have not deemed it necessary to figure.*

2. *From the mounds in the region of Merom, Indiana.* — In a preceding chapter I have given a description of these mounds, and for the skulls recovered in their exploration I am indebted to Dr. H. F. Harper, of that place, who very kindly placed them in my possession.

FIG. 60=½.

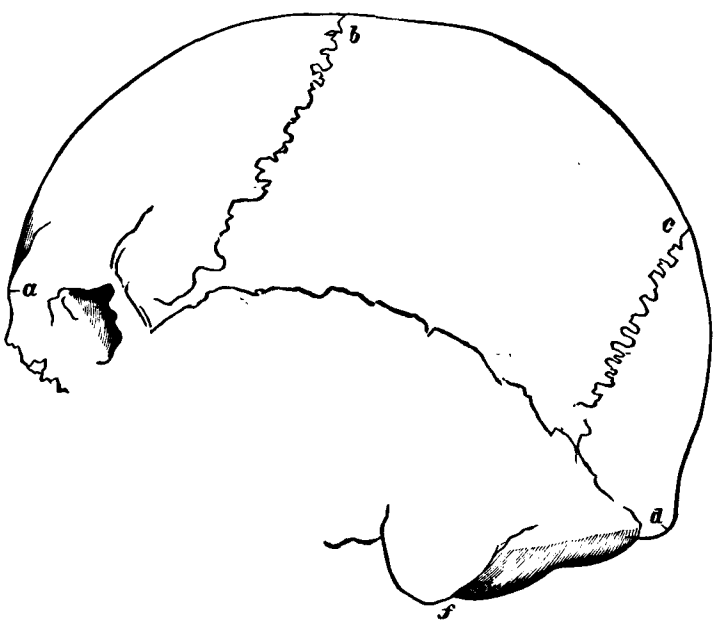


Profile view of a Mound-builder's skull, from Merom, Indiana.

* That portion of this chapter, descriptive of the Mound-builders' skulls, found in the valley of the Des Plaines, and the generalization as to the former existence on this continent of an anomalous race, characterized by a remarkably depressed forehead, was submitted by me to the Chicago Academy of Sciences, in the winter of 1869–70, and the subsequent discoveries which have been made but confirm me in the views originally entertained as to the low type of the Mound-builders' skulls. The specimens unfortunately perished in the great fire of Oct. 8, 1871.

This skull has about the same brain capacity as that from Stimpson's Mound (Fig. 57), rising a little higher in the vertical region, and bulging out at the frontal eminences and supra-orbital ridges. It is a good illustration of what I regard as typical of the Mound-builder's skull:— the *Gothic arch* outline; the very considerable space between the occipital crest and foramen magnum; the approach in the squamosal suture to a horizontal line; and the great development of the occipital crest, forming the extreme posterior part. The back view shows the *pyramidal* form, caused by the flattening of the parietal plates, and the zygomatic arches, as seen in the vertical view (not represented) sweep out beyond the general contour.

FIG. 61=½.

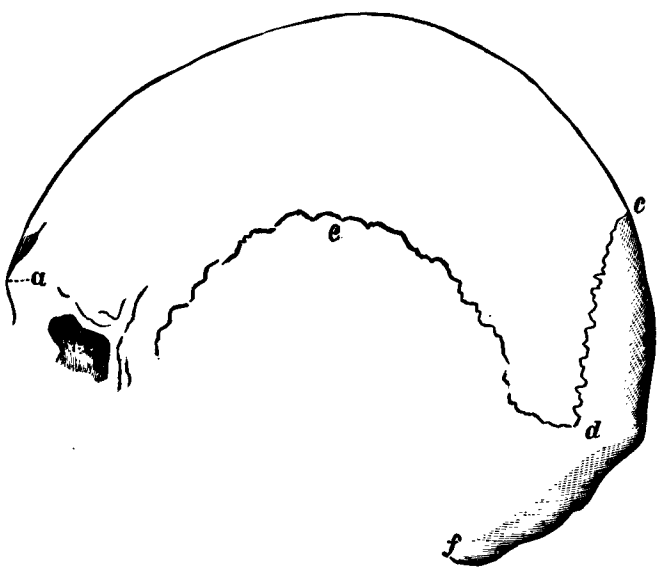


Profile of a Mound-builder's skull, from Merom, Indiana.

In this specimen, the frontal eminences are more conspicuous; the superciliary ridges are less developed; the space between the foramen magnum and occipital crest is less; but still the latter point forms the posterior extremity, and the squamosal suture approaches a straight line.

If we regard a high forehead as the index of mental power — a feature which is due to the retreat of the facial bones, and therefore indicating a divergence in the development in these parts from the corresponding parts in the lower animals, we have in this skull an example intellectually above those previously described. The facial angle is less acute, and the brain capacity is greater; but still, in these respects, this skull falls far below that of the average Teuton.

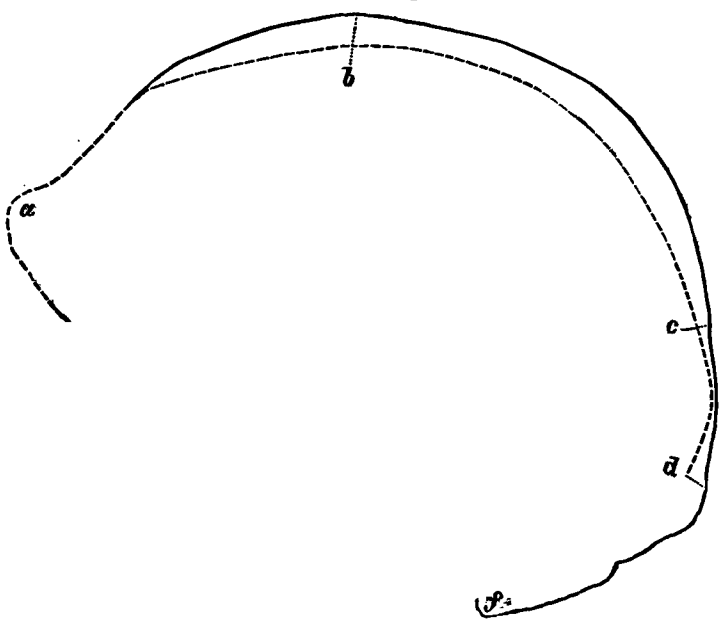
FIG. 62=½.



Profile of a Mound-builder's skull, from Merom, Indiana.

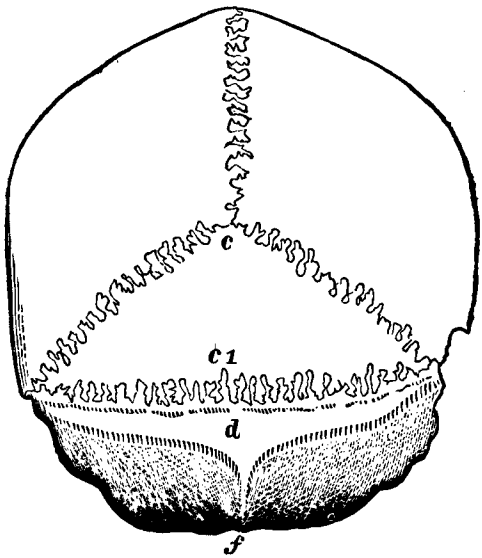
This skull differs from the preceding illustrations, being of a less elongated form, but has other characteristics which link it to the race of Mound-builders, such as the wide interval between the points *d f*, and its posterior occipito-extremity. The frontal sinuses are inconspicuous, and there is a deficiency of development, judged by the European standard, in the frontal and parietal regions. That it belonged to a mature individual is inferred from the fact that the coronal suture is nearly obliterated. The parietal walls are flattened, and the vault is pyramidal. The left lobe of the cerebrum is unduly developed, as will be seen by reference to the vertical view (Fig. 70) but not more so than is to be seen in European skulls at this day.

FIG. 63 = ½.



Fragment of a Mound-builder's skull, from Merom, Indiana. The dotted line represents the contour of the Neanderthal skull.

FIG. 64 = ½.



Posterior view of the same, showing the "Ossa Wormensia."

In Fig. 63 representing the fragmentary portion of a skull extending from the posterior margin of the foramen magnum to the coronal suture, we have a lower development than in the famous Borreby skull from Denmark.

In the posterior view, Fig. 64, it will be seen that there is an extra suture just above the occipital ridge *c* 1, giving origin to what anatomists call the *Ossa Wormensia*. This peculiarity I observe in the skull of a Flathead now before me, and traces of the former existence of such a suture I detect in many of the Mound-builders' skulls which I have figured. While this Wormian bone is not uncommon in European skulls, it is an interesting enquiry whether it is not of more frequent occurrence in the lower races of mankind.

The above profile views of four skulls from this region have certain points of resemblance among themselves, and also as compared with those which I have already described.

When my attention was first directed to these low forms, I tried to argue that they were the result of artificial pressure, or that in their long entombment, they had become warped and distorted. Had I seen but a single specimen, I might have said that it was anomalous, that it belonged to an idiot; but when I find the same typical characters pervading the crania from widely-separated points, and that in their outlines they are symmetrical, I am led to the irresistible conclusion that these characters are congenital.*

In the exploration of the mounds in the valley of Kankakee, near Laporte, Indiana, by a party of which Dr. Higday formed one, a single cranium only was taken out entire, which he regards in some respects as remarkable.

"Anteriorly," he remarks, "this skull is not only very low, but also extremely narrow, while posteriorly the space of the cerebellum is very much depressed and small, the occipital bone being flattened from its base upwards and forwards, so as to encroach greatly on the space which in well-developed skulls is occupied by the

* I have but a single specimen — from Merom — which clearly shows the effects of artificial pressure. It is a large skull, and a flattened plane occupies the space between the occipital crest and the vertex. The surface for the muscular attachments, unlike most of the other specimens, is very much roughened. Whether this flattening resulted from attachment to the cradle-board in infancy, or from pressure deliberately applied in after life, I am not prepared to say,— perhaps the latter. In this case the flattening is in the occipital region, and therefore entirely different from the usage which prevails among the Flatheads of the Northwest Coast. This flattening has given an undue expansion to the parietals, amounting to a deformity.

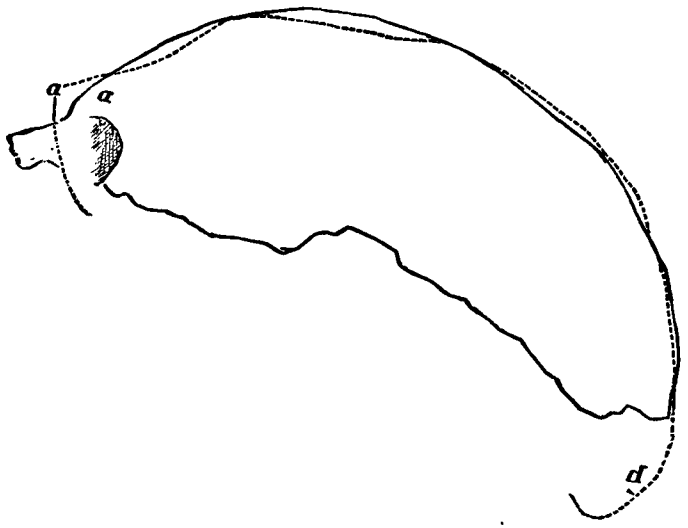
posterior lobes of the cerebum. The extremely deficient development, which can be much better appreciated by an examination than by a description, explains the possibility of a skull having at once diameters of such respectable length and capacity, and yet being so extremely small (sixty inches). That this skull is that of an adult, is evident from the parietal consolidation of some of its sutures, and that it is not a dwarf or an idiot, we must infer from its possessor having had the honor of a mound being built over his remains."*

3. *From the mounds in the region of Dubuque, Iowa.* — The mounds in this vicinity have been described in a preceding chapter. They are by no means conspicuous in size and are destitute of those long lines of circumvallation which so often invest those of the Ohio Valley.

During the recent session of the American Association for the Advancement of Science (1872), several of these mounds were opened, and yielded the remains of human skeletons far gone in decomposition. Three skulls were secured sufficiently preserved to afford a correct idea of their contour, one of which passed into the possession of Mr. Oliver N. Ryan, of Marshall Hall, Maryland, and two were secured by Mr. F. W. Putnam, of the "American Naturalist." Mr. Ryan has kindly furnished me the data for describing the skull in his possession. It was exhumed by Dr. Augustus Campbell, of Dubuque, from a mound about twelve feet high, at Dunleith, Illinois, opposite that city. The corpse was buried about two feet below the surface, and was covered with wood and stone. Appended is a figure of this skull, which is one of the most anomalous ever found.

* "Proceedings Chicago Academy of Sciences." 1870.

FIG. 65 = ½.



Fragment of a Mound-builder's skull, from Dunleith, Illinois.
Dotted line ;—outline of the Neanderthal skull.

Although this skull is fragmentary, sufficient remains to enable us to protract its general outlines. In brain capacity it is as low as the Neanderthal skull; and that it belonged to a mature individual is inferred from the fact that all the sutures are closed. It differs from the Neanderthal skull in this; that while in the former there is a prodigious development of the superciliary ridges, such as have never before been observed in a human cranium, in the latter they are not unduly prominent. It has a marked resemblance in its contour to that from Haas's Park, near Chicago (Fig. 59), but is a little more depressed in the frontal region. The nasal bones, as in that specimen, form a bird-like appendage, though not quite so conspicuously marked.

The Neanderthal skull, it need hardly be observed,

affords the nearest approach hitherto observed, to the confines of that gulf which separates man from the anthropoid types.*

In a review of this nature courtesy requires that I recognize the labors of my predecessors; and I must

* As this work is passing through the press I acknowledge the receipt of photographs of two characteristic Mound-builders' skulls, preserved at Milwaukee, with a descriptive note, from my valued friend Dr. Lapham. This testimony as to the former existence of an anomalous race, by so cool and accurate an observer as Dr. L., I regard the more valuable, since he was inclined to believe, in his "Antiquities of Wisconsin," that the mounds were heaped up by the ancestors of the Red man.

"Two skulls of the ancient Mound-builders, preserved at Milwaukee, possess characteristics confirming the views lately advanced by you, first at the meeting of the American Association for the Advancement of Science, at Dubuque (1872), and again in the "American Naturalist" for December. One of these skulls from a mound at Wauwatasa, has a breadth of seventy-eight per cent. of its length and would be ranked as *Orthocephalic* or regularly formed head. It is so much flattened behind as to suggest the possibility of artificial compression when young. The other skull has a breadth of only seventy per cent. of its length and therefore ranks as a *Dolicocephalic* or long-head. The peculiar characteristics indicating a low grade of humanity common to both, are a low forehead, prominent superciliary ridges, the zygomatic arches swelling out beyond the walls of the skull, and especially the prominence of the occipital ridge. The anterior portion of these skulls besides being low are much narrowed, giving the outline, as seen from above, of an ovate form.

"It seems quite probable that men with skulls of this low grade were the most ancient upon this continent; that they were the first to heap up those curiously-shaped mounds of earth which now so much puzzle the antiquary; that they were gradually superseded and crowded out by a superior race, who adopting many of their customs continued to build mounds and to bury their dead in mounds already built. Hence we find Mound-builders with skulls of this ancient form, associated with others of more modern type.

"The discovery of these skulls with characteristics so much like those of the most ancient of pre-historic types of Europe, would seem to indicate that if America was peopled by emigration from the Old World, that event must have taken place at a very early time — far back of any of which we have any record." (Private Correspondence.)

I regret that I cannot give the figures of these skulls, but hope to be able to do so hereafter.

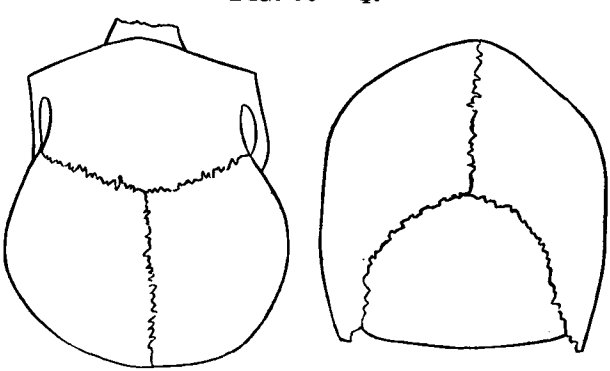
say, that, with a single exception, in the figures heretofore given of Mound-builders' skulls, I fail to recognize the *typical* characters. Squier and Davis in their admirable work, profess to have collected but one skull which they regarded as authentic of the Mound-builders, but any comparative anatomist, on referring to their plate, will instantly recognize it as of the Indian type.

Dr. Morton justly describes it as "perhaps the most admirably formed head of the American race hitherto discovered. It possesses the national characteristics in perfection, as seen in the elevated vertex, flattened occiput, great interparietal diameter, ponderous bony structure, salient nose, large jaws, and broad face."*

Comparing this skull with those which I have figured, it will be seen that the Scioto skull differs widely from the true Mound-builder's skull in its most characteristic features.

Morton gives figures of two supposed Mound-builders' skulls, one of which was furnished by the late Dr. Troost, from a mound near the junction of the Broad, French, and Holstein Rivers in Tennessee, represented in the annexed

FIG. 66 = ¼.



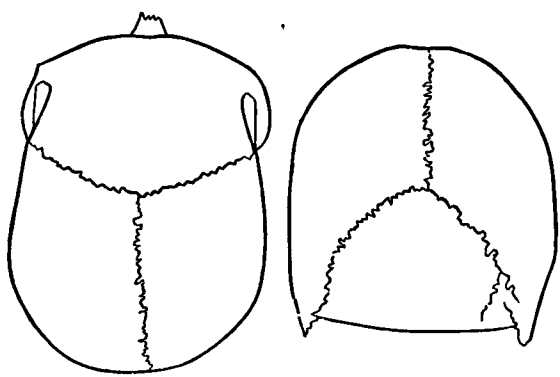
Supposed Mound-builder's skull from Tennessee.

* Morton, "Crania Americana," p. 220, pl. xxxix.

This skull is remarkable for its great vertical and parietal diameter, and its elevated occiput,—characters which do not belong to the skulls which I have described. The following are the measurements: Longitudinal diameter, 6.6 inches; Parietal, 5.6; Frontal, 4.1; Vertical, 5.6; Internal capacity, 87.5 cubic inches. The left portion of the middle lobe of the brain-case is distorted, which may have resulted from the individual, in infancy, having been strapped to a cradle board.

The second example, given by Morton,* is of a skull from a mound on the Upper Mississippi, one hundred and fifty miles above the mouth of the Missouri, represented in

FIG. 67 = ¼.



Supposed Mound-builder's skull from the Upper Mississippi.

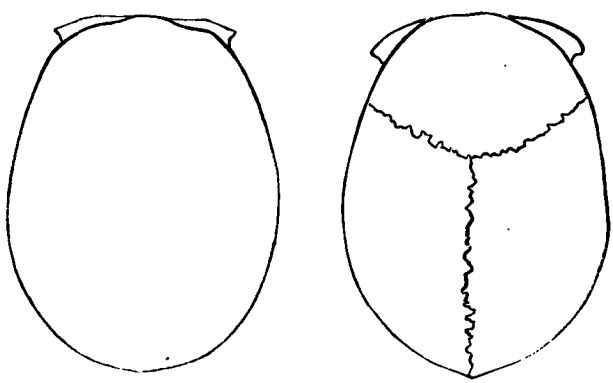
The skull from the Grave Creek mound, West Virginia, figured by Morton and reproduced in Schoolcraft's work, is of the Indian type.

Lapham, in his "Antiquities of Wisconsin," has figured a skull from a mound, which has some of the characteristics of the Flathead.

* Ibidem, p. 229, pl. vi.

Classification of skulls.— In the classification of skulls, comprehending the relation of breadth to length, those which are less than seventy-three to one hundred are called long or *Dolicocephalic;* those whose proportions are less than seventy-four and seventy-nine to one hundred are medium, or *Orthocephalic;* and those whose proportions reach eighty and eighty-nine to one hundred are *Brachycephalic.* The Mound-builders' skulls which I have examined, differ on the one hand, from the Indian type, which is *Brachycephalic,* and from the Teutonic, on the other, which is *Dolicocephalic.* They are intermediate, or *Orthocephalic,* as will be apparent from the following figures, reduced to one-fourth the natural size:

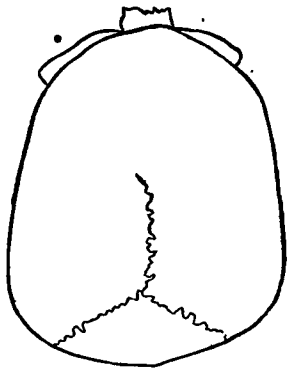
FIG. 68. FIG. 69.



Vertical views of Mound-builders' skulls, from Merom, Indiana.

Fig. 68 is a vertical view of the skull represented in Fig. 60, and Fig. 69 of that represented in Fig. 61. The vertical view represented in Fig. 70 is the skull represented in Fig. 62. The latter approaches the

FIG. 70.



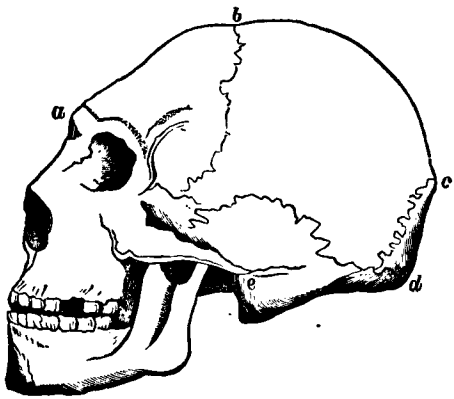
From Merom, Indiana.

short-head form, and while the corresponding walls are not symmetrical, there is nothing to indicate artificial distortion. In Figs. 68 and 69 the relation of breadth to length is about seventy-three to one hundred, and in Fig. 70 it reaches seventy-four to one hundred. This ellipsoidal form, or in other words, this deviation from the great interparietal diameter, which is characteristic of the Indian type, and which gives to the savage his ferocious and untamable character, is a broad distinction which cannot be overlooked. From these examples of a want of conformity in craniological development, apart from other evidences, I think we are justified in drawing the conclusion that the Mound-builders were not the ancestors of the North American Indians.

The question arises, whether this singular conformation of skull is congenital, or the result of artificial pressure. We know that the Flatheads and Chenooks of the Columbia River indulge in this usage at the present day, and there is reason to believe that other tribes did formerly. But, with regard to the Mound-builders' skulls, it may be said that, while the volume of the brain is small, the brain-case is as symmetrical as that of the European. Where artificial pressure is resorted to, as pointed out by Morton, the brain in volume is not diminished, but is extraordinarily developed in

those parts of the case where the pressure is not applied, and hence we have the most grotesque distortions. The course of every bandage is marked by a corresponding cavity in the bony structure. This is illustrated in the following figure, the original of which was furnished me by Dr. W. H. Boyd:

FIG. 61=¼.



Skull of a Flathead, in the Museum of the Chicago Medical College.

The distortion of this skull, as seen in the profile, is enormous, but in the vertical view, not given, it is still more exagerated, the left parietal wall bulging out like a great tumor. There were apparently two bandages applied to effect this distortion,—one across the frontal bone, just above the superciliary ridges, and one just back of the coronal suture.

Distinctive characters.— The skulls which I have described possess peculiarities which ally them more nearly with the Mongolian race than with the Negro or European. They belong in one respect to what Dr.

Prichard calls the *Pyramidal type*, but in other respects they present characters which are *sui generis*. The pyramidal form, seen in cross section, arises from the peculiar conformation of the malar bones, giving an outward sweep to the zygomatic arches.

I append a synopsis of what I regard as the distinctive characters of the Mound-builder's skull, selecting for the purpose the one represented by Fig. 60, which belongs to neither the lowest nor the highest forms; and that the reader may compare these peculiarities with those of the idiot as given by Humphry, I shall, as far as convenient, follow his order of description.* It is to

* "The skull of the idiot," says Humphry, "presents in many respects an approximation to the skull of the lower animals, especially that of the ape, in the following particulars: The facial bones are proportionately large; the brain case is contracted in every direction, more particularly in front and above, causing lowness and narrowness of the forehead, but also behind and below; the space behind the foramen magnum is small, and the bone slopes obliquely upward from it to the occipital crest; the foramen itself partakes somewhat of this slant; the occipital condyles are small and preternaturally convex, and the basilar portion of the occipital bone ascends with unusual obliquity from them; the temporal fossæ are deep; the temporal ridge is well-marked and ascends to a comparatively high level, and this, together with the flattening of the parietal bones, and the prominence of their sagittal portion, constitutes an approximation to a 'sagittal crest.' The line of union of the temporal with the parietal bones is straighter than usual, and the post-glenoid process is rather more marked. The frontal bone projects far backward, in the situation of the anterior fontanelle between the parietals; the posterior and middle cerebral fossæ are shallow. . . . The foramen magnum and the other foramina for nerves are comparatively large; the foramina for vessels, as well as the grooves for the sinuses are, on the other hand, comparatively small. The cranial bones are generally thick, and the sutures early obliterated.

"The orbits are comparatively large, their anterior outlines are oblique and the superciliary ridges prominent and project beyond the general width of the cranium." ("A treatise on the Human Skeleton," by G. W. Humphry, Lecturer on Surgery, in the Cambridge, England, University Medical School, p. 233.)

be regretted that in all my specimens, with a single exception, the facial bones are wanting.

In examining this skull in its general outlines the observer is struck by the scantiness of brain capacity, seen in the narrow forehead, the receding frontal bone, and a similar recession in the region of the lambdoidal suture, which give to the vertex an undue prominence, and to the longitudinal arc an outline approaching in form a Gothic arch.

That portion of the occipital bone behind the foramen magnum, instead of being continued in a nearly straight line, as seen in the European skull, curves up to the occipital crest. The occipital condyles are small, and "the basilar portion of the occipital bone ascends with unusual obliquity from them." "The foramen magnum and the other foramina for nerves at the base, are comparatively large; the foramina for vessels as well as the grooves for the sinuses are, on the other hand, comparatively small." The post-glenoid process, as in the Negro, is strongly marked; the occipital crest is highly ridged, and arched convexly like the figure ∼: and the point where these arches intersect forms the extremity of the skull; the temporal fossæ are deep and the temporal ridge is prominent; the apex is about midway between the coronal and lambdoidal suture; the parietal plates, instead of swelling into a rounded outline, are flattened; the suture connecting the squamous bones with the parietal is less convex than in the European, and in this respect approaches that of the chimpanzee and the lower animals, in whom it is nearly straight; the superciliary ridges are strongly marked and project beyond the general contour of the brain-case: and the glabella forms the extreme point of the anterior portion of

the skull. The orbits, where bounded by the superciliary ridges and the nasal septum, owing to the deep supra-orbital notch, are of a quadrangular shape; the frontal eminences are very slight, which makes the superciliary ridges more conspicuous and the forehead more retreating; and the zygomatic arches swell out beyond the parietal walls, which in the European skull so far overhang as to conceal them in the vertical view. From this point of observation it may be said that all the exterior prominences are visible,—the occipital protuberance, the zygomatic arches, and the superciliary ridges.

The frontal bone is of great strength and slopes backward, encroaching on the parietals, and giving origin to a low forehead. In the lower animals this bone becomes nearly horizontal and is placed behind the eyes. "In proportion," says Humphry, "as the cranial portion slopes backward, so do its facial buttresses — the nasal and angular processes — slant forwards; and in proportion as the brain is well developed and the cranial part of the bone is upright, so are the facial processes directed perpendicularly downwards. In the lower animals, for instance, they grow directly forwards, in the lower races of mankind they grow downwards and forwards, and in the best formed human skulls they grow almost vertically downwards."

Such are the characters which seem to predominate in the Mound-builders' skulls,— characters which distinguish them from the Negro on one hand and the Teuton on the other. Individual variations occur, as might be expected, for we are not to suppose that all have been cast in a single mould. All the specimens indicate a low intellectual organization, little removed from that of the idiot.

On comparing the figure with a European skull, these anatomical traits will be apparent by contrast, particularly the increased development of the frontal and parietal regions, the outward curving of the occiput, the horizontality of the line between the occipital ridge and the foramen magnum, and the convexity of the squamosal suture.

It is the preponderance of the brain-case over the facial portion of the head, that gives to man his superiority as compared with the lower animals, and we estimate the mental grasp and the capacity for improvement in the several races of men by the same standard. The skull, in size and outline, has a general conformity to the enclosed brain; the bony walls take their shape from the nervous tissue, as the shell of the oyster is shaped to accommodate its living tenant. The brain is undoubtedly the seat of mental activity, and, without endorsing phrenology in all its details, we may affirm that a particular form of skull is indicative of particular traits of character. We place the seat of the intellectual faculties in the anterior lobe; of the propensities which link us to the brute, in the middle lobe; and of those which appertain to the social affections, in the posterior lobe. The predominance of any one of these divisions in a people would stamp them as either eminently intellectual, or eminently cruel, or eminently social. The Mound-builders, assuming these skulls to be typical, were doubtless neither eminent for great virtues nor great vices, but were a mild, inoffensive race, who would fall an easy prey to a crafty and cruel foe. Under the guidance of a superior mind, we can imagine that they would be content to toil, without weighing deliberately the nature or amount of the reward. Like the Chinese, they could probably imitate

but not invent; and, secure from the irruption of enemies, they would, in time, develop a rude civilization.

The Indian possesses a conformation of skull which clearly separates him from the pre-historic Mound-builder, and such a conformation must give rise to different mental traits. His brain, as compared with the European, according to George Combe, differs widely in the proportions of the different parts. The anterior lobe is small, the middle lobe is large, and the central convolutions on the anterior lobe and upper surface, are small. The brain-case is box-like, with the corners rounded off; the occiput extends up vertically; the frontal ridge is prominent; the cerebral vault is pyramidal; the interparietal diameter is great; the superciliary ridges and zygomatic arches sweep out beyond the general line of the skull; the orbits are quadrangular; the forehead is low; the cheek-bones high; and the jaws prognathous. His character, since first known to the white man has been signalized by treachery and cruelty. He repels all efforts to raise him from his degraded position; and whilst he has not the moral nature to adopt the virtues of civilization, his brutal instincts lead him to welcome its vices. He was never known voluntarily to engage in an enterprize requiring methodical labor; he dwells in temporary and movable habitations; he follows the game in their migrations; he imposes the drudgery of life upon his squaw; he takes no heed for the future. To suppose that such a race threw up the strong lines of circumvallation and the symmetrical mounds which crown so many of our river-terraces, is as preposterous, almost, as to suppose that they built the pyramids of Egypt.

Was there an autochthonous race having this form of

skull? — In the results of archæological explorations at other points on this hemisphere, we have evidence of the existence of nations whose skulls had many of the distinctive features which appertain to those of the Mound-builder.

Dr. Lund, a distinguished Swedish naturalist, many years ago, in the bone caves of Minas Geraes, Brazil, found the remains of men associated with those of extinct quadrupeds under circumstances which led him to believe that the whole were contemporaneous. In his communication to the Geographical and Historical Society of Brazil, an abstract of which was forwarded to Dr. Morton by Lieutenant Strain, he says:

"The question then arises, who are these people? Of what race, and what their intellectual perfections? The answers to these questions are, happily, less difficult and doubtful. He examined various crania, in order to determine the place they ought to occupy in anthropology. The narrowness of the forehead, the prominence of the zygomatic bones, the maxillary and orbital conformation, all assign to these crania a place among the characteristics of the American race, and it is known that the race which approximates nearest this is the Mongolian; and the most distinctive and salient character by which we distinguish between them is the greater depression of the forehead in the former. In this point of organization, these ancient crania show not only the peculiarity of the American race, but this peculiarity, in many instances, is in excessive degree, *even to the entire disappearance of the forehead.*

"We know that the human figures found sculptured on the ancient monuments of Mexico, represent, for the greater part, a singular conformation of head, being without forehead, the crania retreating backward immedi-

ately above the superciliary arch. This anomaly, which is generally ascribed to an artificial disfiguration of the head or taste of the artist, now admits of a more natural explanation, it being proved by these authentic documents, that there really existed in this country a race exhibiting this anomalous conformation. The skeletons which were of both sexes, were of the ordinary height, although two of them were above the common stature. These heads according to the received opinion in craniology, could not have occupied a high position intellectually." *

Upon the altar-tablets and bass-reliefs of Copan and Uxmal, in Central America, as reproduced by Catherwood, we have this type of skull delineated by artists who had the skill to portray the features of their race. These artists would not select the most holy of places as the groundwork for their caricatures. This form, then, pertained to the most exalted personages.

Humboldt and Bonpland were the first to draw attention to this remarkable configuration of skull. The former, as far back as 1808, thus stated:

"This extraordinary flatness is found among nations to whom the means of producing artificial deformity are totally unknown, as is proved by the crania of Mexican Indians, Peruvians, and Atures, brought over by M. Bonpland and myself, of which several were deposited in the Museum of Natural History of Paris." †

Mr. Pentland supposed this conformation to be congenital, and states that this view was confirmed by Cuvier, Gall, and many celebrated anatomists. Tiedemann's expressions are: "A careful examination of these skulls has convinced me that their peculiar shape

* "Journal Academy of Natural Sciences, Philadelphia," 1844.

† "Political Essays," vol. i, p. 159.

cannot be owing to artificial pressure. The great elongation of the face, and the direction of the plane of the occipital bone are not to be reconciled with this opinion, and therefore we must conclude that the peculiarity of shape depends on a natural conformation." Knox says: "The form of the head I speak of, is peculiar to the race; it may be exaggerated somewhat by such means (pressure), but cannot be so produced."

Sir Robert Schomburgk found on some of the affluents of the Orinoco, a tribe known as the Frog Indians, whose heads were flattened by nature. A child was born while he was with them, which he saw an hour after its birth, that had all the characteristics of the mother's tribe, "and the flatness of its head, as compared with the heads of other tribes, was remarkable."*

Rivero and Tschudi, whose researches in South America command confidence, believe that the artificial disfigurement of the skull which prevailed among the Inca-Peruvians, owed its origin to the prior existence of an autochthonous race, having this peculiarity; and they further state that it is seen in the fœtus of Peruvian mummies.

Retzius, contrary to the opinion of Morton, has shown that the ancient Peruvians and the Huanchas of Tschudi, were *Dolicocephali*, although he regards their skulls as much disfigured by artificial compression, while the Aztecs belonged to the *Brachycephali*. He has further shown that this practice of artificial deformation instead of being confined to this continent, was in vogue among some of the Oriental nations, among the Swiss Lake-dwellers, and that it still exists in France.†

Upon the question whether this peculiarity, if the

*"Journal Royal Geographical Society," xv., pp. 53-34.

†Retzius, "In relation to the Form of the Human Skull," *passim*.

result in the first instance of artificial pressure and persisted in for generations, would become congenital, the following authorities may be cited. "In all changes which are produced in the bodies of animals by the action of external causes, the effect terminates in the individual; the offspring is not in the slightest degree modified by them." *

"Nothing," says Dr. Prichard, "seems to hold true more generally, than that all acquired conditions of body, whether produced by art or accident, end with the life of the individual."

Darwin would probably account for this peculiarity on the ground of Sexual Selection.†

These authorities would indicate that there was a conformity in the craniology of the earlier races on this hemisphere, embracing the primeval people of Brazil, the Huanchas of Peru, the Platform-builders of Mexico, and the Mound-builders of the Mississippi Valley.

The Peruvian skull, as compared with the Indian, is deficient in capacity, being, according to Morton, no greater than that of the Hottentot or New Hollander. In measuring 155 crania of the former, they gave but seventy-five cubic inches for the bulk of the brain, while the Teutonic crania gave ninety-two inches. The average between the Peruvian and Indian is nine inches in favor of the latter.‡

How is it, then, it has been asked, that with this low mental power, these Peruvians should have been able to construct such stupendous works, and develop a very considerable civilization, while the Indian, with far

* Lawrence, "Lectures," etc., p. 436. For the compilation of many of these authorities, I am indebted to Mr. S. F. Haven, "Archæology of the United States," (Smithsonian Contributions.)

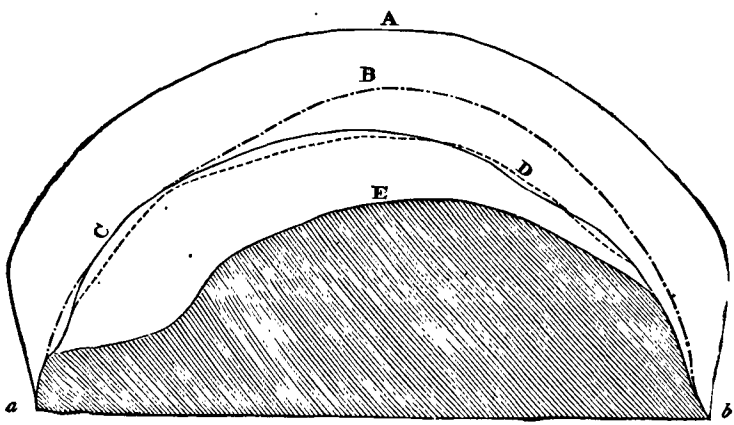
† See "Descent of Man," chap. viii.

‡ Morton's "Crania Americana."

greater volume of brain, exhibits such slight constructive power, and has resisted all attempts to elevate his condition? Mr. J. S. Phillips has attempted to answer this question:

"The intellectual lobe of the brain of these people, if not borne down by such overpowering animal propensities and passions, would, doubtless, have been capable of much greater efforts than any with which we are acquainted, and have enabled these barbaric tribes to make some progress in civilization. . . . The intellectual and moral qualities of the Mexicans and Peruvians are left more free to act, not being so subordinate to the propensities and violent passions."*

FIG. 72.



Comparative size of different skulls.

A Contour of European skull.
B " " that from Stimpson's Mound, No. 57.
C " " that of the Neanderthal Skull.
D " " that from the Dunleith Mound, No. 65.
E " " the Chimpanzee skull.
a The glabella.
b The occipital crest.

*Appendix to Morton's "Physical Type of the American Indian."

Above, I give the contours of the most anomalous skulls referred to in this chapter, reduced to a uniform scale.

So great is the range of variation in the crania of the living tribes of men that it is unsafe to pronounce upon their average capacity except from an examination of a large collection. Thus far but few authentic Mound-builders' skulls have been exhumed, and they indicate that that race must have ranked intellectually below the lowest types of Australia and New Caledonia.

Leaving out the Engis skull which shows a good degree of mental grasp, it may be said that the earliest types of man are inferior, as indicated by the Neanderthal skull, as well as by those recovered from the Danish and British tumuli, to say nothing of the strange human jaw found by Dupont in Belgium, which approaches those of the anthropomorphous apes, and another of analogous traits found by the Marquis de Vibraye in France, both of which are supposed to be referable to the dawn of the human period. There is nothing to indicate modern degeneracy, whether applied to the intellectual or physical capacity of the Teutonic race. So far from it, there are strong grounds for believing that our remote ancestors lived in brutal barbarism, with modes of thought and daily pursuits far different from those of the educated and much-planning man of to-day; and that, through a state of progression, long continued, often checked, but still acquiring strength to advance, a portion of the human family have been able to attain a high degree of civilization — a civilization which implies intellectual culture and an ability to render the forces of nature subservient to human wants and conveniences.

That the investigator may comprehend the relative

rank which the Mound-builder occupied in what I may call the scale of humanity, I give the following table of measurements of the crania of the superior and inferior races of mankind, as they exist at this day;—those from the United States being taken from "The Military and Anthropological Statistics of the War of the Rebellion," published by the Sanitary Commission under the editorship of Dr. B. A. Gould,* and those from foreign sources being reproduced from Huxley:

TABLE OF MEASUREMENTS.

NOTE. If the hair and scalp were removed, the circumference would be reduced from one to one and one-half inches.	Circ'f. around forehead and occiput.	Distance between condyloid processes.			P'rph'ry from eyebrows to occipital crest.
		Over forehead and occiput.	Over top of the head	Over occiput.	
White Soldiers	22.13	11.31	13.31	11.82	14.48
Iroquois	22.48	12.08	13.71	11.58	14.45
Mulattoes	22.00	12.34	14.11	12.24	13.55
Negroes	21.91	10.98	13.95	11.55	14.40

In the following table, while giving the measurement of English and Australian skulls, as well as of those known as the Engis and Neanderthal skulls belonging to a pre-historic race, I also append, for the purpose of comparison, the measurements of the true Mound-builders' skulls described in this chapter:

* This truly admirable work is a great storehouse of facts, to which everyone who would study the Anthropology of our country should resort. Crude notions have been expressed that our climate is so baneful to the European, that were it not for fresh accessions from abroad, our continent would soon be depopulated. We have here ample materials for comparing the physical development of Americans, not only among themselves, but with those of other nationalities; and the effects of climate and regimen are clearly set forth.

TABLE OF MEASUREMENTS.

NATIONALITY.	A	B	C	D	E	F
English	21	13.75	12.50	4.40	7.87	5.33
Australian (No. 1)	20.50	13	12	4.75	7.50	5.40
" (No. 2)	22	12.50	10.75	3.80	7.90	5.75
Engis, Belgium	20.50	13.75	12.50	4.75	7.75	5.25
Neanderthal, Prussian Empire	23	12	10	3.75	8	5.75
Merom, Indiana (No. 60)	20.50	12.87	11.25	4	7.25	5.50
" " (No. 61)	20.62	12.87	12	3.87	7.37	5.37
" " (No. 62)	19,50	12.50	11.62	4.37	6.62	5.62
" " (No. 63)	21	13.50	12.50	4.12	7.12	6
Chicago, Illinois (No. 57)	20.25	12.50		3.80	7.60	5.75
Laporte, Indiana	18.50	10.50	10.30	3.80	6.50	5

A The horizontal circumference in the plane of a line joining the glabella with the occipital protuberance.

B The longitudinal arc from the nasal depression along the middle line of the skull to the occipital tuberosity.

C From the level of the glabello-occipital line on each side, across the middle of the sagittal suture to the same point on the opposite side.

D The vertical height from the glabello-occipital line.

E The extreme longitudinal measurement.

F The extreme transverse measurement.

NOTE.— Professor Jeffreys Wyman, Curator of the Peabody Museum of American Archæology, in his "Fourth Annual Report" (1871), which has fallen under my notice since the text of this chapter has been prepared, thus speaks of the collection of Mound-crania from Kentucky, made by the late S. S. Lyon, under the joint patronage of that Museum and the Smithsonian Institution:

"A comparison of these crania with those of the other and later Indians, shows that they have certain marked peculiarities, though these are better appreciated when the two kinds are placed side by side, than from any tables of measurement or verbal descriptions.

"The twenty-four crania measured, show a mean capacity of 1313 centimmes, which is greater than that of the Peruvians, but less than that of the North American Indians generally (viz: 1376 c. c., or 84 cubic inches). They differ, also, from those of the ordinary Indians in being lighter, less massive, and in having the rough surface on the muscular attachments less strongly-marked. The top of the head shows a moderately angular or roof-shaped arrangement of the parietal bones, and the sides are vertical. In proportions, they present very considerable variations

amongst themselves. Assuming the length of the skulls to be 1.000, the breadth ranges from 0.712 to 0.950 of the length. The average proportion is 0.857, which places them in the short-headed group. This result is influenced, but not to any great extent, by the fact that the crania have been somewhat distorted by a flattening of the occiput. In the majority, this flattening is very slight, and is indicated by a nearly plane surface just above the protuberance, and which would not materially diminish the length of the skull. The position of the foramen magnum is quite far back. We have shown elsewhere, that in the North American Indians generally it is further back than in the Negro and other races with which they have been compared. In the Mound-crania the distance of the anterior edge of the foramen magnum from the occiput, is only 0.372 the long diameter of the skull. This position can be only partially due to distortion, since in three skulls, in which the foramen was farthest back, the occiput was not in the least flattened."

The flattening of the tibiæ has been found to prevail among the skeletons belonging to the pre-historic nations of the Old World, presenting in this respect a resemblance to the corresponding bones of the ape. Dr. Wyman recognizes this peculiarity in a large series of bones obtained from the mounds of Kentucky, Tennessee, and Michigan, and from the shell-heaps of Florida. He, however, remarks that "this can hardly be considered a race character, since it is found in only about one-third of all the individuals observed." (Fourth Annual Report, pp. 21, 22.)

Dr. H. F. Harper recognized the same peculiarity in the skeletons recovered from the mounds of Merom, Indiana. He remarks: "I have six tibiæ in my possession which were taken from a mound, besides the fragments sent you, which were the most flattened of any. By measurement, all have a transverse diameter of from ten to fifty per cent. less than the antero-posterior, while the extremities are enlarged transversely, as in our race. Two of the six are shorter and heavier than the others, and are curved anteriorly and full half an inch or more out of line. These two have also a transverse diameter almost equal to the antero-posterior one." (Private Memoranda.)

CHAPTER IX.

MANNERS AND CUSTOMS AS THE BASIS OF ETHNIC RELATIONS.

TO undertake to trace ethnic relations between widely separated peoples, by similarity of manners and customs, is an uncertain guide. Man, apart from his improvable reason, has what we call, in the higher animals, instinct; and as the beaver everywhere constructs his dam according to a definite plan, so will man perform certain acts instinctively, after a certain manner. Hence, among barbarous nations, we may expect to find a similarity of manners and customs, without necessarily supposing that they are the result of inheritance; but when we come to the higher manifestations of art, the result of improvable reason, there are found certain characters original and unique, which become infallible guides in tracing national affinities.

In this chapter I propose to inquire how far similarity of customs, such as sacred observances, funeral ceremonies, consecrated offerings, uniformity of weapons, linguistic expressions, craniological types, civilization as manifested in art, the domestication of animals and plants, etc., may be employed in establishing ethnic relations between the peoples of the two hemispheres, and in tracing back their origin to a common fountain of life.

With regard to the manners and customs of that mysterious people, the Mound-builders, the past is not altogether speechless. Enough of their monuments survive to enable us to form an intelligible opinion as to their architecture, their system of defense, their proficiency in art, their habits and pursuits, their religious observances, and the routes of their migrations.

Sacred observances have prevailed among every branch of the human family, from the earliest historical period, and, in fact, such customs can be traced back to the pre-historic peoples. Few tribes have been found so far degraded as not to have some vague ideas of an Overruling Power; few that believed that death was utter annihilation. The cultivated man rises to the conception of a purely Spiritual Essence, but the savage must embody that Power in some visible object.* As the sun is the most striking object in nature, it is not surprising that he should have been worshipped by rude tribes in all ages as the Visible Deity.

Sun-worship, practised by the ancient inhabitants of Central America, Mexico, by the Natchez Indians, and undoubtedly by the Mound-builders, can be traced back to the remotest antiquity. According to Rawlinson, it was the religion of the Scythic tribes, who thickly spread themselves, in ancient times, over the whole extent of Western Asia. It crept into the religion of the Persians some time after their great migration to the West. Zoroaster, whose name is closely associated with primitive Magism, is represented by various writers as an early Bactrian or Scythic king. The Sun-God was probably one of the earliest objects of Babylonian worship, and was personified in the Apollo of Grecian

* "The God of the savages was what the metaphysicians endeavored to express in the word *substance*." (Bancroft.)

mythology. To him were applied such epithets as "The Great Mover," "The Regent of the Heavens and Earth," and "He who sets everything in motion."* In the later period of the Roman Empire, even, the sun was worshipped at Emesa, under the name of Elagabalus, and typified in the form of a black conical stone, which it was believed had fallen from heaven. Constantine, before his conversion to Christianity, paid his devotions to the genius of the sun, and crowned his altars with votive offerings. Julian, after his apostasy, dedicated a domestic chapel to his tutelar deity, the sun, and every morning saluted the parent of light with a sacrifice, and another victim was offered the very moment when he sank below the western horizon.†

It is not strange, then, that, in primitive times, men, in recognizing the manifest agency of the great luminary in stimulating the powers of nature, should be disposed to recognize that agency as extending to human affairs, and therefore bow in adoration at his rising and setting.

Burial with the deceased of those articles which were the most useful or most highly-prized by them while living, seems to have prevailed, at one time or another, among nearly every nation. It clearly shows that even the rudest tribes have certain definite ideas as to the immortality of the soul,—of a continued state of existence, on which the spirit enters through the portal of the grave. The burial cave of Aurignac, France, as has been shown, contained human remains which are regarded as of the highest antiquity; yet here we meet with the evidences of funeral feasts, and of offerings consecrated to the dead.

* Rawlinson's "Herodotus," vol. i, p. 341 *et sequitur.*

† Gibbon's "Decline and Fall," chap. vi, *passim.*

Offerings were placed in the grave of the Mound-builder,—urns, supposed to have contained food, water-jugs, statuettes, pipes, beads, and other ornaments, that the spirit might be presentable on his introduction to a new sphere of existence.

The Indian is buried with his bow and arrows, his war-paint, his moccasins and other trappings, that he may be prepared at once to enter upon his favorite pursuits in the shadowy land; and, day after day, the choicest viands are placed at the head of his grave, that his spirit may not flag.

An American poet (Philip Freneau) has embodied this supposed shadowy existence in the following lines:

"By midnight moons o'er moistening dews,
In vestments for the chase arrayed,
The hunter still the deer pursues,
The hunter and the deer a shade.*"

Schiller, too, has commemorated this custom in the beautiful lines beginning "Bringet her die letzten Gaben," which have been truthfully rendered by Sir E. L. Bulwer: †

"Here bring the last gifts!—and with these
The last lament be said:
Let all that pleased and yet may please,
Be buried with the dead.

"Beneath his head the hatchet hide,
That he so stoutly swung,
And place the bear's fat haunch beside—
The journey hence is long!

"And let the knife new-sharpened be,
That on the battle-day
Shore with quick strokes—he took but three—
The foeman's scalp away.

* Quoted by Bancroft, "History of the United States," chap. 23.
† Quoted by Lyell. "Antiquity of Man," p. 189.

"The paints that warriors love to use,
Place here within his hand,
That he may shine with ruddy hues
Amidst the spirit-land."

The Aryan of the Vedas burns the priestly sacrificial implements with the dead man's body, for his use in the next world. The Mound-builders practised the same usage. The Chinese provides his dead ancestor with food, clothing, and money, but with the thieving propensity characteristic of his race, he contrives to palm off on the defunct a pasteboard coin, covered with silvergilt leaf. He prepares, with pious care, a feast of souls, but if, after waiting a reasonable time, the invited ghosts fail to arrive, he and his friends fall to and eat it. The Indian, more scrupulous, holds his festivals in honor of the dead, when part of the food is given to the flames, that the hunger of his ancestors may be appeased.

Ovid sings how these offerings of food in ruder times, had, in his day, become merged in an affectionate, sentimental ceremony:

Parva petunt manes — pietas pro divite grata est
Munere. Non avidos Styx habet ima deos."

Slight are the gifts demanded by the dead,
The pious thought subserves as well instead,
For Styx contains no greedy gods.

The early Christians kept up the usage of burying ornaments with the dead, and putting the playthings of the child in its grave, just as the Indian mother does at this day.

"When we see a wreath of everlastings," says Mr. Taylor, "laid upon the tomb, or a nosegay of fresh flowers thrown into an open grave, a full knowledge of the history of funeral offerings seems to justify us

in believing what we should hardly have guessed without it, that even here we see a relic of the thoughts of the rudest savages who claim a common humanity with us, a funeral offering vastly changed in signification, but nowhere broken in historic sequence."*

Human sacrifices.—Akin to this usage was that of sacrificing human beings as well as animals at the shrines of the dead. This usage, it is inferred from the charred human bones, prevailed among the Mound-builders, and also, as we have seen, in Mexico and Central America.

Among the ancient Scythians, when a king died, in the open space around the body, were buried one of his concubines, his cook, lacquey, cup-bearer, messenger, etc., they having been previously strangled, together with some of his horses, and the firstlings of all his other possessions. After the lapse of a year, fifty of the deceased king's attendants were strangled, together with fifty of the most beautiful horses. The horses were disembowelled and stuffed with chaff, and then mounted, all bitted and bridled, upon strong stakes. The fifty strangled youths, having undergone a similar manipulation, were mounted on the horses, and were thus ranged round the tomb and left, presenting a ghastly spectacle.†

The Thracian custom, according to the same authority, was this: "Each man among them has several wives, and no sooner does a man die than a sharp contest ensues among the wives upon the question, which of them all the husband loved most tenderly.

* Edward Bennett Taylor, "On traces of the early mental condition of Man." (Proceedings Royal Institute, Great Britain, republished in Smithsonian Report, 1868). I acknowledge myself indebted to him for many of the historical illustrations here brought together.

† Vide "Herodotus," book iv, chap. 72.

The friends of each largely plead on her behalf, and she to whom the honor is adjudged, after receiving the praises of both men and women, is slain over the grave by the hand of her next of kin, and then buried with her husband. The others are sorely grieved, for nothing is considered such a disgrace."*

The chief within whose domain De Soto died, is said to have killed two young men to wait upon him. The burning of captives at the stake by the Indians is in part the result of a religious sentiment.

During the Stone Age of Great Britain it is inferred that slaves were sacrificed at their masters' graves; and it is not improbable that wives were burnt with their husbands, and children were buried with their mothers, —a dreadful custom which prevails at this day among some of the Esquimaux families. Among the Feegees it is usual, on the death of a chief, to sacrifice a certain number of slaves, whose bodies are called "grass for bedding the grave."† In others of the South Sea Islands, when the husband dies, the wife is strangled, that her soul may accompany his to the spirit land, there to catch fish and cook yams for him. The Hindoo widow mounts the funeral pyre, that liberated, she may perform similar menial services for her deceased lord.

These horrible customs are all founded on the belief that the offerings will accompany the spirit in its passage to the other world, and there minister to its comforts; and it is evident that they have prevailed in almost every country, and from the remotest time. "A slight acquaintance with the spiritualism of the savage,"

* Ibidem, book v, chap. 4.

† Vide citations from Bateman, as to ancient British burials; Williams as to the Feegee customs, in "Pre-historic Times," p. 171.

remarks Mr. Taylor,* "has sometimes led to its being considered as the result of a degeneration from the opinions of more cultivated races; but more complete knowledge of the facts tends to show that such an opinion inverts the real history of events."

Scalping a dead enemy, it has been supposed, was a custom peculiar to the Indian of this country, but it prevailed, according to Herodotus, among the ancient Scythians.

"The Scythian soldier," he states, "drinks the blood of the first man he overthrows in battle. Whatever number he slays, he cuts off all their heads and carries them to the king; since he is thus entitled to a share of the booty, where he forfeits all claim if he does not produce a head. In order to strip the skull of its covering, he makes a cut round the head near the ears, and laying hold of the scalp, shakes the skull out; then with the rib of an ox he scrapes the scalp clean of flesh, and softening it by rubbing it between the hands, uses it thenceforth as a napkin. The Scyth is proud of these scalps, and hangs them from his bridle-rein; the greater number of such napkins that a man can show, the more highly is he esteemed among them." †

Flint and stone implements, which attest man's first attempts to subdue nature, present such marked resemblances the world over, that generalizations as to ethnic affinities, drawn from this source, are of little value.

"It is now a generally accepted canon," says Mr. Westropp, "that there are common instincts implanted by nature in all the varieties of the human race which lead mankind in certain climates and at certain stages

* "Traces of early mental condition," etc., before referred to.

† Book iv, chap. 64.

of civilization, to do the same thing in the same way, or nearly so, without teaching or without previous communication with those who have done so before. This has been remarkably confirmed in the analogous and almost identical forms of flint and stone implements found all over the world, and also in the identity of ornamentation, such as the zigzag, guilloche, etc., designed independently, by races the most widely apart." *

The best material to be employed, and the shape best adapted to produce the desired result, would be the offspring of experience, and not of inheritance.

The study of languages affords a reliable guide in tracing the migrations of tribes, even where they have become intermingled with other tribes. In the social relations thus established, there would not result a total obliteration of the language of the one tribe, but certain words and forms of speech would be adopted and perpetuated. "Nothing," says Bancroft, "is so indelible as speech. Sounds that, in ages of unknown antiquity, were spoken among the nations of Hindostan, still live in their significancy in the language which we daily utter." Palgrave echoes the same sentiment. "Language adheres to the soil when the lips which spoke it are resolved into dust. Mountains repeat, and rivers murmur the voices of nations denationalized or extirpated in their own land."

All European languages can be traced back to the Sanscrit as an approximate common source, but the language of the American Indian throws no light upon his origin, except that that origin was so far remote that all attempts, by this clue, to establish a common

* "Journal of Ethnological Society." Quoted in "Nature," June 2, 1869.

centre of human creation, are utterly futile. Gallatin, Duponceau, and others, who have made this language the subject of profound study, find that it is of different branches, traceable perhaps to a single root, but primitive in its character, and differing radically from those of other continents. According to Gallatin, when the vast variety of dialects came to be compared, there were found, east of the Mississippi, not more than eight radically distinct languages, of which five still constitute the speech of powerful communities, and three belong to tribes that have almost disappeared. In the forms of grammatical structure and in the modes of associating and of expressing ideas without regard to the meaning of particular words, the Indian tongues would seem to be the result of the instinctive impulses of the human mind to express ideas of relation, quality, and action. "No theories of derivation from the Old World," says Hayden, "have stood the test of grammatical construction. All traces of the fugitive tribes of Israel, supposed to be found here, are again lost. Neither Phœnicians, nor Hindoos, nor Chinese, nor Scandinavians, nor Welsh have left an impress of their national syntax behind them. But the dialects of the people of the Western Continent, radically united among themselves, and radically distinguished from all others, stand in hoary brotherhood by the side of the most ancient vocal systems of the human race." * As the human voice articulates not more than twenty distinct sounds, whatever resemblances there may be in the particular words of different languages, are of no ethnic value, but it is upon this test that many American writers have undertaken to trace the origin of the Red man.

* Hayden, "Archæology of the United States" (Smithsonian Contributions), p. 54.

Mr. Bancroft has given an elaborate review of the dialects of America, and arrives at these results:

"No American language bears marks of being an arbitrary aggregation of separate parts; but each is possessed of an entire organization, having unity of character, and controlled by exact rules. Each appears, not as a slow formation by painful processes of invention, but as a perfect whole, springing directly from the powers of man. A savage physiognomy is imprinted on the dialect of the dweller in the wilderness, but each dialect is still not only free from confusion, but is almost absolutely free from irregularities, and is pervaded and governed by undeviating laws. . . . Each American language was competent of itself, without improvement of scholars, to exemplify every rule of the logician, and give utterance to every passion. Each dialect that has been analyzed, has been found to be rich in derivatives and compounds, in combinations and forms. . . . Human consciousness and human speech exist everywhere, indissolubly united. A tribe has no more been found without an organized language than without eyesight or memory. . . .

"If we search for the distinguishing traits of our American languages, we shall find the synthic character pervading them all and establishing the rules. The American does not separate the component parts of the proposition he utters; he never analyzes his expressions; his thoughts rush forth in a troop. The picture is presented at once and altogether.

"It has been asked if our Indians were not the wrecks of more civilized nations. Their language refutes the hypothesis; every one of its forms is a witness that their ancestors were, like themselves, not yet disenthralled from nature."*

* "History of the United States," vol. iii., pp. 234, 235, 265.

Mr. Gallatin thus sums up his conclusions as to the character of the American languages: "That from the Arctic Ocean to Cape Horn, while they number more than one hundred, differing in their vocabulary, they have, as far as has been investigated, a distinct character common to all, and apparently different from those of the other continent with which we are most familiar; that they bear the impress of primitive languages, and assumed their form from natural causes, and afford no proof of their being derived from a nation in a more advanced state of civilization, and that they attest the antiquity of the population,—an antiquity the earliest we are permitted to assume."

The high antiquity of man, which has since been revealed by the discoveries of the geologist, was not dreamed of when Mr. Gallatin wrote, and hence he felt it necessary to express no opinions "inconsistent with the opinion of an Asiatic origin and with the received chronology."

To account for the radical diversity and great multiplication of languages, "we want the longest time we are permitted to assume," and therefore he infers that this continent was peopled at a very remote epoch, "probably not much posterior to that of the dispersion of mankind."*

While thus, then, the Indian spoken language has all the elements of a primitive character and of a high antiquity, there must have been another language, the vehicle of more exact expression and of more refined ideas, spoken by the inhabitants of Central America, which has become irrevocably lost. A people who can express their ideas by arbitrary symbols must be immeasurably superior to a people who use a notched

* See synopsis of Mr. Gallatin's views in Hayden, pp. 61, 64.

stick as the record of events, or trace rude figures on the smooth bark of a tree. The North American Indian has never advanced beyond mere picture-writing to perpetuate his ideas. He takes to himself a name, represented by some animate or inanimate object in nature, which he can grave with an arrow-point or trace with a charred bit of wood. He can link together his symbolical devices so as to convey to some extent consecutive ideas, but those ideas do not resolve themselves into words.

The Aztec system of writing, while symbolical, was carried to a higher development, and separate words were indicated. It became a species of mnemonics, intelligible only to the initiated, and incapable of a literal interpretation. The hieroglyphics displayed upon the walls of Copan, in horizontal or perpendicular rows, would indicate a written language in which the pictorial significance had largely disappeared, and a kind of word-writing had become predominant. Intermingled with the pictorial devices are apparently purely arbitrary characters which may be alphabetic. This, however, may be said, that in the Central American hieroglyphics we have a highly artificial system of writing, to interpret which the Aztec picture-writing affords no aid.

The slight resemblances which have been discovered between the roots of words in the American language on the one hand, and of the Hebrew on the other, and a single text in the apocryphal book of Esdras, have been the foundation of a belief heretofore quite prevalent among writers upon American ethnology, that this continent was originally peopled by the lost tribes of Israel, whose descendants were to be recognized in the Red man. The missionaries Mayhew and Elliot enter-

tained this belief; distinguished theologians, such as Stiles, Smith, and Bourdenot, wrote treatises to prove it; and the Jews themselves were ready to recognize the relationship. Not content with hypotheses merely, some of these works contained absurd myths, such as that a messenger from the "Ten Tribes" had appeared in Palestine, to inquire into the condition of the remnant of their people; and that another adventurer had found a community of Jews in Peru, by whom he had been entertained for several days, and that this statement had been sworn to before "Manasseh Ben Israel, the chief Rabbi, at Amsterdam."

It is hardly necessary at this day to advert to a belief which was profoundly entertained a century ago, except as an evidence of the progress of ethnological knowledge. The historian of the United States, however, has seen proper to seriously enter upon its refutation. "It is chiefly on supposed analogies of customs and of language that the lost tribes of Israel 'who took counsel together to go forth into a far country, where never mankind dwelt,' have been discovered, now in the bark cabins of North America, now in the secluded valleys of Tennessee, and again as the authors of culture on the plains of the Cordilleras. We cannot tell the origin of the Goths and Celts; proud as we are of our lineage, we cannot trace our own descent; and we strive to identify, in the most western part of Asia, the very hills and valleys among which the ancestors of our Red men had their dwellings. Humanity has a common character. The ingenious scholar may find analogies in language, customs, institutions, and religions, between the aborigines of America and any nation whatever of the Old World; the pious curiosity of Christendom, and not a peculiar coincidence, has

created a special disposition to discover a connection between them and the Hebrews. Inquirers into Jewish history, observing faint resemblances between their own religious faith, have sought to trace the origin of common ideas to tradition from the same nation and the same sacred books, when they should not have rested in their pursuit of a common source till they had reached the Fountain of all Knowledge and the Author of all Being."*

The form of the skull is a reliable guide in tracing ethnic relations. That of the American Indian has been regarded by Morton so far unique as to justify him in making the following emphatic declaration:

"Our own conclusion, long ago derived from a patient examination of the facts, is, that the American race is essentially separate and peculiar, whether we regard it in its physical, moral, or its intellectual relations. To us there are no direct or obvious links between the Old World or the New; for, even admitting the seeming analogies to which we have alluded, these are so few in number, and evidently so casual, as not to invalidate the main position. And even should it hereafter be shown that the arts, sciences, and religion of America can be traced to an exotic source, I maintain that the organic characters of the people themselves, through all their endless ramifications of tribes and nations, prove them to belong to one and the same race, and that this race is distinct from all others."†

* Vol. iii, pp. 211, 212.

† "Ethnology and Archæology of American Aborigines," p. 9. That singular race, confined to the circumpolar regions of both hemispheres, and known on this continent as Esquimaux, and on the other as Lapps, Morton and other comparative physiologists regard as distinct from the North American Indian. Retzius classes them as "Prognathic Dolicocephali." The Esquimaux, since known to the white man, have

The late Anders Retzius, of Stockholm, who has done so much in the field of craniometry, strongly dissents from these views. "It is scarcely possible," he says, "to find anywhere a more distinct distribution into *Dolicocephali* (long-heads) and *Brachycephali* (short-heads) than in America. From all that I have been able to observe, I have arrived at the opinion that the dolicocephalic form prevails in the Carib Islands, and in the whole eastern part of the American continent, from the extreme northern limits to Paraguay and Uruguay in the south; while the brachycephalic prevails in the Kurile Islands and on the Continent, from the latitude of Behring's Strait, through Oregon, Mexico, Ecuador, Peru, Bolivia, Chili, the Argentine Republic, Patagonia, to Terra del Fuego.

"There can be no doubt that the Carib race was the predominant one, not only in the Lesser Antilles, but on the neighboring continent, where we now find Venezuela and Guiana, and all the Carib skulls which I have examined are dolicocephalic."

The Indians of Brazil he assigns to the "Tupi" of the Portuguese, who, farther to the south, received from the Spaniards the name of Guarani — a great race, which, according to Prichard, "is spread over the whole eastern coast of South America, from the mouth of the river La Plata to the Amazon." "The

evinced no disposition to encroach on the domain of the neighboring Indians, although their superiors in warfare. "They are truly," says Sir John Richardson, "a littoral people, neither wandering inland nor crossing wide seas." (Arctic Explorations, p. 202.) So, too, the Lapps on the other hemisphere, have never shown a disposition to penetrate to Central Europe, but have rather retreated before the advance of civilization. Thus, with no formidable physical barrier to intercommunication between the two hemispheres, these people have not shown a disposition to seek, by migration, a different climate from that in which they were born and reared.

ancient Peruvians, of Morton," says Retzius, "and the *Huanchas* of M. de Tschudi, are also Guarani."

The skulls of this race are dolicocephalic, and of much capacity, with the jaws quite large. Towards the north, on the Atlantic, he recognizes this type in the Algonquins and Iroquois, and in the Cherokees of the Gulf Coast.

He regards the *Dolicocephali* of America as nearly related to the Guanches of the Canary Islands, and to the Atlantic populations of Africa — the Moors, Tuaricks, Copts, etc. "We find, then, one and the same form of skull in the Canary Islands in front of the African Coast, and in the Carib Islands on the opposite coast which faces Africa. The color of the skin on both sides of the Atlantic is represented in all these populations as being of a reddish brown, resembling somewhat leather tanned brown; the hair is the same; the features of the face and build of the frame, as I am led to believe, presenting the same analogy."

The *Brachycephali*, he maintains, are found, for the most part, on that side of our continent which looks towards Asia and the isles of the Pacific, and they seem to be related to the Mongol races — a view first expressed by Humboldt. Some of these *Brachycephali* possessed a high degree of culture at the period of the Spanish Conquest. The Aztec skulls are described as being remarkable for the shortness of their axis, their large flattened occiput obliquely truncated behind, the height of the semicircular line of the temples, and the shortness and trapezoidal form of the parietal plane. They present an elevation or ridge along the sagittal suture; the base of the skull is very short, and the face slightly prognathic, as among the Mongol-Kalmucs. They bear a strong analogy to the skulls of Peruvian Brachycephali delineated by Morton.

This type he recognizes in the following tribes which are restricted to the limits of the United States: The Natchez, Chetimanchees, Creeks, Seminoles, Osages, and Menomonees. He regards the skulls figured by Morton from mounds in Tennessee, Ohio, and West Virginia as belonging to this type.*

The opinions of this eminent comparative physiologist appear to be conclusive against those who maintain the unity of all the American tribes; and whilst he pays a deserved tribute to the profound researches of Morton, he avows that "this remarkable man has allowed the views of the naturalist to become warped by his linguistic researches."

The artificial deformation of the skull, at the time of the publication of Morton's work, was supposed to be a usage restricted to several tribes of Indians now living, and to the ancient Peruvians and inhabitants of Central America; and this usage has been cited as a strong argument to show the filiation between the ancient and modern inhabitants of this continent; but Retzius has shown that this pagan custom has been referred to by various writers, Oriental, Greek, and Roman. In 1849, M. Rathke stated that artificially-formed skulls had been found near Kertch, in the Crimea, and called attention to certain passages in the works of Hippocrates and Strabo, overlooked by medical writers, in which these authors speak of the practice of modifying the shape of the head by means of bandages, as being in use among the macrocephalic (long-headed) Scythians.

In 1854, Dr. Fitzinger published a memoir on the

* Retzius, "Present state of Ethnology in relation to the Form of the Skull." Translated for Smithsonian Report, 1860, p. 264, *et seq.* See also Wilson ("Pre-historic Man," ch. xxi).

skulls of the Avars, a branch of the Uralian Turks, and pointed out that ancient authors mentioned this usage as having prevailed in several parts of the Empire of the East, and at the same time described an ancient skull, greatly distorted by artificial means, which had been found in Lower Austria.

In 1854, Retzius received from M. Troyan, of Switzerland, two skulls of ancient date, artificially compressed, derived from that region, which he described in a report to the Academy of Stockholm. He, also, showed that this custom still prevails in the South of France, and from a passage in Vesalius, he was led to believe that it exists also in various parts of Turkey.

"Among the greater part of them," he concludes, "the compression seems to have been effected on the occiput with a view of rendering it flat and short. The compression of the top of the head among the Indians of Oregon (Flatheads) has, no doubt, sprung from their proximity to the Esquimaux, whose heads are full and large. The frontal depression among the Huanchas and Caribs seems to have been designed to render the head more dolicocephalic, and was exclusively practised by the *Dolicocephali*." *

Thus, then, this usage becomes of little value in tracing national affinities.

Civilization, as it develops itself in permanent structures which combine elegance of form, grace of outline, and elaboration of ornament, affords the means of determining how far it is the result of inheritance, and how far it is something which has grown out of the conception of the artist. As in the human face there are distinct

* Retzius, p. 269. Dr. Wilson ("Pre-historic Man," chap. xxi.) has also elaborately discussed this question and accumulated additional authorities as to the prevalence of this usage.

types, at once recognizable by the practised eye, so in the various civilizations, as manifest in art, there is something inherent in it and created with it, which can never be confounded with pre-existing forms. There is the impress of genius, original, unique, and which stands out in bold relief.

"The art of Egypt," says Wilkinson, "was of native growth, and was original and characteristic; but the Egyptians, like other people, borrowed occasionally from those with whom they had early intercourse." *

The pyramids, the sphynxes, and obelisks are not to be confounded with the structures of any other civilized nation; and what is remarkable, none of these monuments have a rude or archiac style.

The Assyrian monuments, also, have a national character. The colossal bulls, lions, and winged circles, are characteristic features, and the bass-reliefs wrought with great elaboration, even to the individual hairs of the beard, and to every stitch in the embroidery of the dress, find no counterpart in the art of other people.

The grace of outline and correctness of detail which are so inimitably displayed in Grecian art, form a broad contrast to the stiff and spiritless delineations of the human figure, seen on the Egyptian tombs.

In the ruins of Central America we have the most elaborate forms of sculpture adorning the altars, idols, and temples. "It is the spectacle," says Stevens, "of a people skilled in architecture, sculpture, and drawing, and beyond doubt, other more perishable arts, and possessing the cultivation and refinement attendant upon these, and not derived from the Old World, but originating and growing up here without models or masters,

* Note on "Herodotus," book ii, chap. 155.

having a distinct, separate, independent existence, like the plants and fruits of the soil, indigenous." *

In reference to the architecture of the "House of the Governor," at Uxmal, he further observes: "There is no rudeness or barbarity in the design or proportions. On the contrary, the whole wears an air of architectural symmetry and grandeur. . . . If it stood at this day, on its great artificial terraces in Hyde Park or the garden of the Tuilleries, it would form a new order; I do not say equalling, but not unworthy to stand side by side with the remains of Egyptian, Grecian, and Roman art." †

In the platform mounds of the Mississippi Valley, we have the rude or archiac type which subsequently culminated in forms of beauty, as seen in the foundations of the temples of Central America.

We seek, then, in vain for any analogies in art which would connect the civilization of this country with that of the Old World. That art was not derived from a remote source; it was the outgrowth of a people domesticated to the soil. These artists, by copying nature, have left behind a series of figures in graceful attitudes, and with a finish of execution, which command the admiration of every beholder.

In the arts, at this day, two methods are employed to produce the desired result: 1, *Manipulation*—strictly handicraft; and 2, *Machinery*, in which the forces of nature are made available. In the former process, it may be said, we have not surpassed the ancients; in fact, their works in sculpture, in architecture, in clay, and in gem-cutting, are models for us,—beautiful in design and accurate in execution. We now by a corruption of

* "Incidents of Travel in Central America," vol. ii p. 311.

† Ibidem, p. 429.

language employ the word *manufactures*—hand-made—to designate the products of machinery; and it is in this department alone that we display our immense superiority over our ancestors. As to the relative degree of intellectual development, it may be said that the mind of him who superintends a machine which turns off certain forms with a precision and certainty which are unattainable by handicraft, is taxed only in a slight degree; and he whose life-labor has been restricted to grinding needles to a point, or in attaching heads to pins, while he may have attained the highest proficiency, dies with very limited conceptions of the forces of nature, or the grandeur of the universe. He, on the other hand, who devises processes in a particular art, and executes them with his own hands, while he may be less skillful than his mechanical competitor, far outranks him in range of intellect. Among the ancients, we find the artist and artizan combined, and, hence, while we may surpass them in mechanical execution, there is a fertility of design which we have failed to approach.

In comparing the ancient civilizations of the two hemispheres, if they were derived from a common origin, there are certain arts which, it would seem, when once acquired, would never be permitted to lapse. Take for example the art of iron smelting, and the additional art of converting the product into steel. How manifold its uses and applications! Leaving out those of a modern date, which are, indeed, the most wonderful, our ancestors at the dawn of the Historic Period knew many of its uses. The hoe, the axe, the plough, the saw, the sword, the ship-bolt, the pruning hook, the needle, the chisel, the chain, the arrow and spear-head, and the anchor, were among the forms into which it was wrought. What a tremendous implement was placed

in the hands of man to subdue nature, when he could wield a steel axe in the place of a stone hatchet! With the chisel, the refractory block of stone could be readily fashioned into ornamental forms. With bolts, galleys could be bound together so firmly as to withstand the heaviest seas, and the sword became so effective an implement of warfare that it has been retained to the present day.

Iron was known to the principal nations, whose manners and customs have been described by Herodotus. Thus, in the Egyptian process of embalming, we are informed that the embalmers extracted the brain through the nostrils with "a crooked piece of iron." The blue color of the swords and other weapons on the painted tombs of Thebes, shows that they employed steel as well as bronze. Butchers, too, are represented as sharpening their knives with a steel attached to their aprons.

Among the rude Scythians, we are informed by the same authority, that the worship of the simitar prevailed, which consisted in planting on the top of a mound an antique iron sword, which served as the image of Mars, and yearly sacrifices of cattle and horses were made to it.

Iron was known long before the Trojan war. Hesiod, the eldest of the European poets, sings of it, and Homer uses this simile in reference to the plucking out of Polyphemus's eye: "As when a brazier dips a large hatchet or axe in cold water, greatly-sounding, tempering it, *for this is the strength of steel*, so his eye hissed."*

The allusions to iron in the early Scriptures are frequent. Tubal-Cain, we are informed, was "an instructor of every artificer in a knowledge of brass

* "Odyssey," ix, line 390, *et. seq.*

and iron." Egypt is likened to the "iron furnace."* Og, king of Bashan, had an iron bedstead.† Job informs us that "Iron is taken out of the earth, and brass is molten out of the stone."‡ The Phœnicians knew its uses, and it was employed in tools for building Solomon's temple.

The use of iron, then, by the civilized nations of the Old World reaches back to the Historic Era.

No implement of iron has been found in connection with the ancient civilizations of America. The Mound-builders, as we have seen, wrought *as a stone*, the rich specular ores of Missouri, into various instruments which they ground and polished with elaborate care, little conscious that the same material, subjected to a high heat, could be cast into any required form, and converted into much more efficient weapons.

"Iron abounds in Mexico," according to Mr. Tylor, "not only in the state of ore, but nearly pure in aërolites of great size, as at Cholula and at Zacatecas, so that ignorance of its qualities alone could have led to the neglect of this useful metal by the Mexicans. Not far from Huetamo, on the road towards the Pacific, there is a conical hill composed entirely of magnetic iron ore. It is so easily wrought that the blacksmiths in the neighborhood, with no other apparatus than their common forges, make it directly into wrought iron, which they use for all ordinary purposes."§

From these facts the inference is inevitable that if this continent was peopled by migrations from the Old World, it must have been at a period far remote, and

* "Deutronomy," iv, 20.

† Ibidem, iii, 11.

‡ "Job," xxviii, 2.

§ E. B. Tylor, "Anahuac," p. 102.

at a time when mankind was unacquainted with the use of iron.

An argument equally apposite and forcible might be drawn from the absence of those domesticated animals and plants which constitute the visible wealth of a nomadic people. The Scyths of Herodotus have disappeared from the face of Europe, and many have supposed that they found a refuge in America. They certainly had many of the habits and customs of the Indian of the plains. They were indifferent to the cultivation of the soil, and spurned the restraints of a sedentary life. Their houses were movable huts, which sheltered promiscuously the youth of both sexes. Their wanderings were regulated by the seasons. On the approach of summer they moved, with their flocks and herds, to the north, and camped beside some clear-running stream; but as winter approached, they retired south, and sought shelter behind some bluff which overhangs the Volga or the Borysthenes. They were bold and skillful riders, and it was supposed by strangers that they ate and drank, and even slept, without dismounting from their steeds. They formed a sort of movable camp, in which family and property were always included. They were fond of rapine, and were the only nation of whom we read who scalped their victims. With such habits, and with such slight attachments to the soil, they were always in a condition to emigrate, the only motive being the improvement of their condition.* But would they voluntarily move through the vast and desolate region of Siberia to Behring's Strait, abandoning their flocks and herds, which furnished them with an unfailing supply of food,

* As to the character of the ancient Scyths, consult Gibbon, "Decline and Fall," vol. iii. p. 4, *et seq.*

and their horses, which enabled them to accomplish the most distant marches? The dog, too, from the time we first detect his existence, indicated by the presence of his bones in the shell-heaps of Denmark, to the present day, has been the attendant on the European in all his migrations. He can brave all climates, and to the wandering tribes he becomes not simply a companion, but a useful ally. In the hyperborean regions his services are invaluable.

The entire absence of all the domesticated animals in North America, when first known to the white man, and of the domesticated cereals of the Old World, would lead to the inference that if this continent was peopled from Asia, it must have been at a period far more remote than is embraced in the received chronology, and when society was in a purely hunter state.

Causes which lead to permanence of type.—Gibbon has appositely remarked that "the savage tribes of mankind, as they approach nearer to the condition of animals, preserve a stronger resemblance to themselves and to each other. The uniform stability of their manners is the natural consequence of the imperfection of their faculties. Reduced to a similar situation, their wants, their desires, their enjoyments, still continue the same; and the influence of food or climate, which in a more improved state of society is suspended or subdued by so many moral causes, most powerfully contributes to form and to maintain the national character of barbarians."*

Ruskin has reproduced the same observation. "Nations in the savage, like animals in the wild, state are devoid of any striking individual differences. Where the life is the same for all, and no variety of external in-

* "Decline and Fall," vol. iii. ch. 26.

fluences calls forth various powers and qualities in the sentient being, a sameness pervades the class."* Negroes, Caffres, Esquimaux, North American Indians, Calmucks, Chinese, Bushmen, have this peculiarity in common, and even among the Arabs of the Desert, a far higher type of humanity, this fact holds good. "I was now," says the author of Eöthen, "amongst the true Bedouins; almost every man of his race resembles his brethren."

Carl Vogt has remarked: "There can be no doubt that as man approaches more nearly in bodily conformation to the animal, and especially his nearest relative, the ape, the lower his stage of culture. As times go on, these characteristics gradually vanish; the forehead becomes more upright, the skull higher and more dome-shaped, and the projecting countenance gradually recedes under the skull. These changes are the result of man's conflict with his circumstances, and to the mental labor which that conflict entails."†

The Negroid type is believed by many to be the primitive type of mankind, and has remained constant to this day; while the Caucasian type is the result of a more improved state of society, and of more favorable external influences. This question of type will be discussed in a subsequent chapter.

From this hasty review of the languages, civilizations, manners and customs, and cerebral types of the peoples of the two hemispheres, it would appear that there are no sufficiently discriminating features for establishing ethnic relations between them. Every region of the earth, fitted to sustain human life, when first known to the European explorer, was found to be inhabited;—the

* "Modern Painters," vol. ii, p. 106.

† "Report to Congress of German Naturalists."

entire extent of North and South America, Australia, New Zealand, and the isles of the Pacific; and the occupancy of these regions dated so far back as to develop in the inhabitants, under the operation of certain laws but imperfectly understood, distinctive traits of national character.

The primitive condition of these people, for the most part, was that of barbarians, but in a few instances, under favorable conditions of natural forces, they cultivated the arts, and developed a very considerable degree of civilization.

We confess, in attempting to trace the career of man, that there are no continuous streams which enable us to ascend to the common fountain of life. The ancestry even of the most intellectual races, when traced back for a few thousand years, becomes involved in a Cimmerian darkness. Whence sprang the Celt or the Teuton? When did the Negroid type assume its distinctive features, and by what influences has it been perpetuated? How can we explain the primitive and unique character of American language? How explain the peopling of continents and the isles of the sea, girt by barren waters? In vain do we seek in the old civilizations for any connecting links; in vain do we search the languages of the two hemispheres for common forms of expression.

"It is in vain," says William Von Humboldt, "that we direct our thoughts to the solution of the great problem of the first origin, since man is too intimately associated with his own race, and with relations of time, to conceive of the existence of an individual independently of a preceding generation and age."*

* Quoted in "Cosmos," vol. i, p. 365.

CHAPTER X.

WHO WERE THE MOUND-BUILDERS?

INSTEAD of seeking to establish ethnic relations between the Mound-builders and any of the races of the Old World, founded on the apparent similarity of manners and customs, I would look rather for their origin to that race who, in times far remote, flourished in Brazil, some of whose crania are found in the bone-caves of Minas Geraes, in connection with mammalian bones belonging to genera and species now extinct.

These crania, as has been shown, were characterized by a remarkable deficiency of the frontal eminences, amounting to an almost entire absence of the forehead;—a type which we find delineated on the monuments of Mexico and Central America, and which is seen in the crania recovered from the shores of Lake Michigan and the banks of the Wabash and Mississippi.

If we examine the bass-reliefs of the temples of Palenque and the altar-tablets of Copan, as delineated by Catherwood, we shall find that all the figures possess the peculiarity of a low forehead, the prominence of which at this day is regarded as the type of intellectual force. These sculptured figures are not caricatures, but display an ability on the part of the artists to represent the human form in every posture, and with anatomical fidelity. Nor are the people in humble life

here delineated. The figures are regal or priestly; some are engaged in offering up sacrifices, or are in an attitude of devotion; many hold a sceptre or other baton of authority; their apparel is gorgeous; their head-dresses are elaborately arrayed, and decorated with long feathers, probably of the *quezal*, which was the sacred bird of that region. Ornaments depend from their ears; beads are entwined in their hair or encircle their necks; costly tunics are thrown over their shoulders; their loins are girt with rich furs; their feet are shod with sandals; in fact, all their paraphernalia indicate a barbaric pomp which an Oriental monarch might envy. Thus, it is evident that this peculiar conformation of skull was characteristic of the most exalted personages; and, admitting that it was the result of artificial compression, which is only in exceptional cases established, still it is clear that there existed a prototype of what they regarded as manly beauty, to which they wished to conform. That prototype, as we have seen, can be traced back to the remotest antiquity of man on this hemisphere.

The civilizations of the Old World, in the light of modern ethnological discoveries, probably originated in the tropics, and extended with slow advances to the temperate climates. These civilizations resulted, as has been shown, from the profusion of nature, in regions where vegetation is perennial, furnishing man with the spontaneous fruits of the earth, and requiring little or no exertion beyond the plucking of them, and where few precautions are to be taken to guard against cold. Whilst such a climate is not adapted to develop the full power, physical and intellectual, of man, it would form the starting point in his career. Hence, in undertaking to trace the migrations of the Mound-builder, I would

direct attention to the warm climate of Central America, rather than to the hyperborean regions of Siberia and Behring's Strait, as marking the line of his departure.

The primitive lines of emigration, so far as they relate to North America, were probably from the south to the north; nor is there wanting historical evidence of such a movement.

The traditions as well as the monuments of Mexico and Central America, would indicate that there was an older civilization, and of a higher order than that attained by the Aztecs. The latter were the *Brachycephali;* they subjugated the *Dolicocephali*, probably allied to the old Carib race, and, without obliterating their civilization, asserted their physical sway.

As to the origin of the Aztecs, the authorities are conflicting. Torquemada, Boturini, and Clavigero assign to them a northwestern or western origin, and Prescott states that this theory derives stronger confirmation from the light of tradition; whilst Bartlett says that he sees no satisfactory evidence of its truth, and Squier goes still further, and declares that the hypothesis of a migration from Nicaragua and Cuscutlan to Anahuac, is altogether more consonant with probabilities.* The Indians of New Mexico, as we have seen, claim that Montezuma was born in their country, and signalized his early career by founding pueblos as he moved southward, and finally attained supreme power as emperor of Mexico. Whatever their origin, this fact stands out in the history of that country: that the Aztecs moved into the valley of Anahuac only about three hundred years before the Spanish Conquest, and that up to that time had failed to consolidate the Mexican Empire, for it was through an alliance with

* Consult Hayden, "Archæology," etc., p. 148.

the Tlascalans and other tribes, who were unfriendly to the Aztec dominion, that Cortez was enabled to overthrow it.

The Aztecs were not barbarians, but like the Goths in invading the Roman Empire, were disposed to adopt the arts, the civilization, and perhaps even the religion of the conquered. The older ruins show a refined skill which was not attained in those of a more modern date; and the picture-writing on the Aztec monuments fails to interpret the inscriptions of Palenque and Copan.

The Aztecs, grafting their ideas on an older and higher order of civilization, had made themselves skillful artificers, and Bernal Diaz, in describing the splendors of their capital, remarks, that he could compare them to nothing but "the enchanted scenes we had read of in Amadis de Gaul, from the great towers and temples, and other edifices of lime and stone, which seemed to rise up out of the water." They attained a knowledge of the more intricate movements of the solar system; they solved the cause of eclipses, and calculated the length of the solar year. It is quite probable that these astronomical problems, which indicate a high range of intellect, were not wrought out by their own ingenuity, but were derived from the subjugated race.

As to the conquered race, the Abbé Brasseur de Bourbourg,* perhaps the ablest interpreter of the ancient Mexican records, maintains that they were Toltecs or Nahuas—a people identical with the Mound-builders of the Ohio and Mississippi Valleys. These ancient records make repeated mention of an empire

* Mr. J. D. Baldwin, in his "Ancient America," p. 201, *et seq.*, has given an elaborate resumé of de Bourbourg's "Quatre Lettres" and "Sourcè de l'Histoire du Mexique," of which I shall avail myself.

situated at a distance to the northeast, and known as Huehue Tlapalan, from which they came to Mexico, in consequence of domestic insurrection or outside invasion. Their migration was long and toilsome. Some came by land and others by sea. The simple name of the country was Tlapalan, but it was called Huehue (old) Tlapalan, to distinguish it from three other places which they founded in the new region, and to which they attached the same name. One company settled near the Tampico River, and built a town called Panuco. It was conducted by twenty chiefs and followed by a numerous retinue of people. Torquemada found an old record which describes this people as of fine appearance, intelligent, and of industrious and orderly habits, and skilled in the working of metals and stones. They went forward into the country and were well received.

Another account as to the forced emigration of the Toltecs, is to the effect that they were assailed by the Chichimecs—a name applied to all the barbarous tribes of the New World—who were united under one great leader; that there was a terrible struggle, but that after about thirteen years of conflict, the Toltecs, no longer able to resist successfully, were obliged to abandon their country to escape complete subjugation; that two chiefs guided the march of the emigrating nation; and that at length they reached a region near the sea, named Tlapalan Conco, where they remained several years; but that they finally undertook another migration, and reached Mexico, where they built a town called Tollanzinco, and later the city of Tullan, which became the seat of their government.

The oldest certain date, according to the Abbé Brasseur, in the Nahuatal or Toltec language, reaches back 955 years before Christ; and as the Toltecs dwelt for

sometime in the country of Zibalba, before they seized upon the supreme power, their migration must have begun more than a thousand years before the Christian Era. The race whom they dispossessed, was known as the Colhuas, who came in ships probably from South America,—a remnant of the people, as conjectured by the Abbé, who had escaped the terrible calamity involved in the destruction of Atlantis, by the combined forces of fire and water. They were not barbarians, but are described as a people who first planted among them the seeds of civilization and erected great cities. They taught the Chichimecs—the rude tribes—how to cook food and cultivate the soil. These tribes, according to tradition, were the Autochthones—the people by whom the region was occupied "at the beginning of time." It was through an alliance with them that the Toltecs gained supreme power, which appears to have become disintegrated, leaving the country disorganized, two or three centuries before the appearance of the Aztecs.

Some of the seats of the Colhuan civilization were in the region now covered by the great forest, but whether the highest manifestations of art, exhibited in the ruined cities, are to be ascribed to them or to the Toltecs, is a matter of doubt. History presents few examples of a people utterly exterminated; the vanquished, generally absorbed by the victors, and reduced to slavery or obedience, become an element of material wealth, but not of political strength, in building up an empire, just as the Helots were used by the ancient Athenians to cultivate their lands and attend them in battle. Whatever of civilization the Colhuas possessed, was probably adopted and grafted upon by the Toltecs; and that it culminated under their supremacy, is inferred from the

truncated pyramid, which characterises the foundations of all their elaborate and ornamented structures.

Stevens is disposed to adopt the hypothesis that the people found in possession of Central America at the time of the Spanish Conquest, formed a part of the dismembered Toltecan empire, who, while cut off from the central source of communication, were not wholly reduced to Aztec sway. Simple in tastes and content to toil, they exercised little or no influence in the choice of their master; and, as among most of the nations of antiquity, it mattered not to the people whether that master was called king, or caique, or inca, or tyrant. There was exacted a personal servitude; there was an abnegation of every form approaching popular sovereignty. The state controlled the labor of the masses, and its supervision extended to the domestic economy of every household; to the place where the citizen should reside, to the occupation he should follow, and to the wife even he should marry.*

It is to such a condition of society, a condition based on human slavery, that we trace the origin of most of the monuments of antiquity, imposing by their vastness, but frivolous as to their objects. Buckle, in reference to the erection of the pyramids of Egypt, aptly remarks: "No wealth however great, no expenditure however lavish, could meet the expense which would have been incurred, if they had been the work of free men, who received for the labor a fair and honest reward. . . . We may form some idea of the incredible waste (of labor), when we hear that two thousand men were occupied for three years in carrying a single stone from Elephantine to Sais; that the canal of the Red Sea alone cost the lives of one hundred and twenty thousand

* Buckle, "History of Civilization," vol. i, p. 81.

Egyptians; and that to build one of the pyramids required the labor of three hundred and sixty thousand men for twenty years."*

When we read of the great national highway of Peru, Macadamized or paved with slabs of stone, stretching for more than a thousand miles, and connecting together the most distant parts of the empire; of the "princely palaces" of the Incas, built of hewn stone, and supplied with water by aqueducts of costly structure; and when we see such cities in Central America as Palenque, Copan, and Uxmal, magnificent even in their ruins, we must admit the former existence of a well-organized government. When in Mexico, we behold such a vast structure as the terraced pyramid of Cholula, one hundred and seventy-two feet in height, with a base of thirteen hundred and thirty-five feet — nearly double that of the Great Pyramid of Egypt, — with its masonry of brick, and covering an area of forty-five acres; and find that the object of this immense expenditure of human labor was to enshrine, in an interior chamber of stone, two corpses, whose living names have long since perished from the recollection even of their own people, we are brought to the sad conclusion that the industry of the great mass of the population was at the absolute command of the few. These ancient civilizations, in both hemispheres, as attested by monuments which elicit the admiration of posterity, are, in the language of Buckle, "an evidence of a state of things altogether depraved and unhealthy; a state in which the skill and the arts of an imperfect refinement injured those whom they ought to have benefited; so that the very resources which the people had created were turned against the people themselves."†

* Ibidem, vol. i, p. 66. † p. 66.

The platform mound of Cahokia, in the Mississippi Valley, was supposed to contain one-fourth the cubic contents of the great pyramid of Ghizeh; and that of Grave Creek is nearly equal to the third pyramid or that of Mycerinus; and when we consider that these vast piles were heaped up by a people who were destitute of a knowledge of iron, and were compelled to rely on implements of stone, flaked from materials brought often from long distances; and further, that they could not avail themselves of the auxiliary aid of the domesticated animals, such as the ox and the horse; — we must arrive at the inevitable conclusion that the condition of society among the Mound-builders was not that of free men; or, in other words, that the State possessed absolute power over the lives and fortunes of its subjects. This condition of affairs implies a very considerable advance in society, and a complex system of government; and to maintain and perpetuate such a system, there must have been cheap food, whereby only a portion of the labor of the community was required to provide the means of subsistence, leaving a certain portion — a moiety of the whole — to be applied to the construction of those objects which did not directly subserve human wants and conveniences.

As in India rice, and in Egypt the date, furnished the national food, without taxing to an undue extent the energies of the people; so in the Mississippi Valley, maize undoubtedly constituted the great staple of subsistence, and the monuments of its ancient civilization are mainly restricted within the area adapted to its culture. It is a plant highly prolific and easily cultivated, and the product of a single acre furnishes rations sufficient to sustain, for an entire year, all the way from one hundred and twenty, to two hundred and forty able-

bodied men. The area of forest-belt, abundantly stocked with game, required to support an equally numerous population, would vary from nearly eight hundred thousand, to more than a million and one-half acres.

That the Mound-builders cultivated the soil in a methodical manner, far different from the mode pursued by the present Indians, is evident from the vestiges of ancient garden-beds which have been particularly described in a preceding chapter. They relied upon the constantly-recurring seasons of seed-time and harvest as a means of support, rather than upon the precarious chances of hunting and fishing.

A broad chasm is to be spanned before we can link the Mound-builders to the North American Indians. They were essentially different in their form of government, their habits, and their daily pursuits. The latter, since known to the white man, has spurned the restraints of a sedentary life, which attach to agriculture, and whose requirements, in his view, are ignoble. He was never known to erect structures which should survive the lapse of a generation. His lodges consist of a few poles, one end planted in the ground and the other secured with withes at the top, and over which are stretched plaits of matting, or of birch bark, or the skins of the buffalo. This frail structure constitutes his shelter from the elements; and these miserable wigwams are the promiscuous habitations of both sexes. The sanctity of the domestic relation is unknown. Youth and age there find an abiding place for the time being, to be abandoned whenever the inclemency of the season or the scarcity of game supervenes. An eye-witness myself, in early manhood, to the primitive manners and simplicity of this race, I am compelled to confess that the pleasing vision of a people "clothed with

the fairest attributes of peace and innocence," was forcibly dispelled, when I witnessed the fierce passions and cruel hates by which their conduct was swayed. The Arcadian virtues, sung by the poets, as characteristic of primitive society, were entirely wanting.* Cotton Mather, in a rugged and forcible way, describes the Indians, before they had become contaminated with the vices of civilization, as "those doleful creatures, the veriest ruins of mankind to be found on the face of the earth;" "whose clothing was the skin of a beast;" who cured their fish by drying, and not by salting, "for they had not a grain of salt in the world;" who abode in a place until they "had burnt up all the wood thereabouts;" and whose "way of living was infinitely barbarous."†

*General G. A. Custar, in one of his chapters, "Life on the Plains" (Galaxy, January, 1873) says: "My firm conviction, based upon an intimate and thorough analysis of the habits of character, and natural instinct of the Indian, and strengthened and supported by the almost unanimous opinion of all persons who have made the Indian problem a study, and have studied it, not from a distance, but in immediate contact with all the facts bearing thereupon, is, that the Indian cannot be elevated to that great level where he can be induced to adopt any policy or mode of life varying from those to which he has ever been accustomed, by any method of teaching, argument, reasoning, or coaxing, which is not preceded and followed closely in reserve by a superior physical force. In other words, the Indian is capable of recognizing no controlling influence but that of stern, arbitrary power. To assume that he can be guided by appeals to his ideas of moral right and wrong, independent of threatening or final compulsion, is to place him far above his more civilized brothers of the white race, who, in the most advanced stage of refinement and morality, still find it necessary to employ force, sometimes resort to war, to exact justice from a neighboring nation. And yet there are those who argue that the Indian, with all his lack of moral privileges, is so superior to the white race as to be capable of being controlled in his savage traits and customs, and induced to lead a proper life, simply by being politely requested to do so."

†Mather, "Life of Elliot," etc.

The government existing among these people is simply patriarchal. The authority of the chief is held by a slender thread, liable to be severed at any moment; and the questions whether to defend their own borders, or invade those of neighboring tribes, must be determined after numerous smokes and pow-wows, in which the medicine-man with his incantations, plays an important part; so that in the conduct of the Indian, instead of looking to an artless credulity, we are to look to overmastering superstition as his governing motive. As the democratic principle is recognized and acted upon in all their tribal relations, we may well comprehend how distasteful would be an order to throw up a structure such as that at Cahokia or at Grave Creek, involving an amount of personal servitude at which all the free instincts of their nature, fostered by their roving habits, would revolt. No chief would dare issue such a command; no subaltern would engage in the work. The domestic economy of the Indian, then, as contrasted with that of the Mound-builder, exhibits two widely-different conditions of society. In the one case, the people had fixed habitations and methodical pursuits, and the day's labor was crowned with definite and accumulated results: in the other, the people led a nomadic life; a feast followed a famine; and, with their shifting habitations, the accumulation of personal property would prove an incumbrance rather than a convenience.

A summary of the conclusions arrived at in the preceding pages with regard to the origin, customs, and ultimate fate of the Mound-builders, may appropriately form the conclusion of this chapter.

1. That as a race their origin extends back to a remote antiquity; but all attempts to trace that origin to a common fountain of life, as with other races now in-

habiting the earth, soon involve the investigator in the mazes of conjecture.

2. That they possessed a conformation of skull which would link them to the autochthones of this hemisphere,—a conformation which was subsequently represented in the people who developed the ancient civilization of Mexico and Central America.

3. That whilst their manners and customs conformed in many respects to those of ancient races of the Old World, they may be regarded as the result of man's contact with external nature, rather than of inheritance through successive generations, and, therefore, that they are of little importance in tracing ethnic relations.

4. That during their occupancy of the Mississippi Valley, they developed traits in their domestic economy and their civil relations, which distinguished them by a well-marked line of division from the Indian who was found in possession of the continent at the time of its European discovery. Their monuments indicate that they had entered upon a career of civilization: they lived in stationary communities, cultivating the soil and relying on its generous yield as a means of support: they clothed themselves, in part at least, in garments regularly spun and woven: they modelled clay and carved stone even of the most obdurate character, into images representing animate objects, including even the human face and form, with a close adherence to nature: they mined and cast copper into a variety of useful forms: they quarried mica, steatite, chert, and the novaculite slates, which they wrought into articles adapted to personal ornament, to domestic use, or to the chase: unlike the Indians, who were ignorant of the curative properties of salt, they collected the brine of the salines into earthen vessels moulded in baskets, which they

evaporated into a form which admitted of transportation: they erected an elaborate line of defense, stretching for many hundred miles, to guard against the sudden irruption of enemies: they had a national religion, in which the elements were the objects of supreme adoration: temples were erected upon the platform mounds, and watchfires lighted upon the highest summits: and in the celebration of the mysteries of their faith, human sacrifices were probably offered up. The magnitude of their structures, involving an infinitude of labor, such only as could be expended except in a community where cheap food prevailed, and the great extent of their commercial relations, reaching to widely separated portions of the continent, imply the existence of a stable and efficient government, based on the subordination of the masses. As the civilizations of the Old World, growing out of the peculiar conditions of soil and climate, developed certain forms of art which are original and unique, so on this continent we see the crude conception in the truncated pyramid, as first displayed in Wisconsin, Ohio, and Illinois, and the accomplished result in the stone-faced foundations of the temples of Uxmal and Palenque. And finally, the distinctive character of the Mound-builders' structures, and also the traditions which have been preserved, would indicate that this people were expelled from the Mississippi Valley by a fierce and barbarous race, and that they found refuge in the more genial climate of Central America, where they developed those germs of civilization, originally planted in their northern homes, into a perfection which has elicited the admiration of every modern explorer.

5. That regarding human crania in their identity of conformation as among the surest guides in tracing

national affinities, the generalization of Morton that all the tribes of this hemisphere, whether living or extinct, from the Arctic Sea to Cape Horn, exhibit no physical diversity, and are essentially one race, is undoubtedly erroneous; that the two great divisions into *Dolicocephali* and *Brachycephali* are as well-marked as in the Old World; and that if any distinction is to be drawn, it is to the effect that the former were the autochthonous race, and the first to develop the germs of civilization.

CHAPTER XI.

THE UNITY OF THE HUMAN RACE.

IN the discussion of questions relating to the high antiquity of man; his dispersion over the habitable portions of the earth; the diversity of languages; the permanence of types as indicated by color of skin, texture of hair, configuration of skull, and other anatomical peculiarities which appear to be in no degree dependent on climate or personal habits; the query must have suggested itself to every comparative physiologist, Can these diversities be reconciled on the supposition that the whole human race is the offspring of a single pair?

If we admit that the various races of living men, represented by such extremes as the Negroid type on the one hand, and the Caucasian on the other, are the descendants of a common progenitor who lived some four thousand years ago, we find it impossible to explain why these distinctive forms should have manifested themselves at so early a period in the human career, and have remained constant to the present day. Six hundred years before the Christian Era the prophet asked "Can the Ethiopian change his skin?" and modern science has failed to answer the question in the affirmative. Profane records, too, show that these types were well-defined at a time when human history begins,

and that no variety has originated within the lapse of recorded time.

As the readiest solution of this Gordian knot, many ethnologists would look to numerous independent creations in different parts of the earth, and would even separate the genus *Homo* into a sufficient number of species to accommodate all the well-marked varieties of the human race. "Were we to admit," says Lyell, "a unity of origin of such strongly-marked varieties as the Negro and European, differing as they do in color and bodily constitution, each fitted for distinct climates, and exhibiting some marked peculiarities in their osteological and even in some details of their cranial and cerebral conformation, as well as in their intellectual endowments; if in spite of the fact that all these attributes have been faithfully handed down unaltered for hundreds of generations, we are to believe that in the course of time they have all diverged from the common stock, how shall we resist the argument of the transmutationist who contends that all closely-allied species of animals and plants have, in like manner sprung from a common parentage?" *

If, in accordance with the combined investigations of geologists and ethnologists, we carry back the antiquity of man to a period indefinitely remote, we can perhaps imagine a set of causes operating almost silently and unseen through thousands of generations, which would be adequate to explain these diversities, but which have exercised no perceptible influence within the Historic Epoch. So long as the investigator felt the necessity of limiting his inquiries to causes operating within the period of our received chronology, little progress was made; but now the whole question of the origin of man

* "Antiquity of Man," p. 338.

must be reopened and adjusted in accordance with the discoveries of modern science; and I doubt not that there will be found continuous and uninterrupted causes which shall explain all the diversities in the different branches of the human family, without the necessity of resorting to independent creations.

As representing the aspect in which this question is at present regarded, I quote the sentiments of many of the most eminent men of the present generation, who have made it the subject of profound study.

Thus Dr. Prichard says: "Many writers, who have been by no means inclined to raise objections against the authority of the Sacred Scriptures, and particularly Michaelis, have felt themselves embarrassed by the shortness of the interval between the Noachic Deluge and the period at which the records of the various nations commence, or the earliest date to which their historical memorials lead us back. The extravagant claims to a remote and almost fathomless antiquity, made by the fabulists of many ancient nations, have vanished before the touch of accurate criticism; but after abstracting all that is apparently mythological from the early traditions of the Indians, Egyptians, and some other nations, the probable history of some of them seems still to reach up to a period too remote to be reconciled with the short chronology of Usher and Petavius. This has been so universally felt by all those writers who have entered upon the investigation of primeval history that it is superfluous to dwell upon the subject."*

Baron Bunsen is forced to claim for the human race an antiquity of 20,000 years, basing his conclusions on the common origin of language.

* "Researches into the Physical History of Mankind," vol. v. p. 553. Quoted by Lubbock, "Pre-historic Times," p. 385.

"The oldest monuments of Egypt," says the Rev. Dr. Thompson, "can hardly be brought within the date of the flood of Noah, according to the Hebrew chronology. The date assigned to the three great pyramids by most Egyptologists is older than the flood, as this is reckoned in the margin of our bibles; and the lowest date to which Professor Piazzi Smith and other advocates of the shorter chronology would reduce them by astronomical modes of computation, is still far too old to be fairly accommodated to the Hebrew date of the flood. . . . The tablet of Sethos I., recently discovered in the great temple of Abydos, introduces a new element of complication into these calculations. Upon this tablet a monarch, whose period is pretty clearly determined as of the fifteenth century before Christ, is represented as offering sacrifice to his royal predecessors, of whom there are seventy-six in an unbroken line up to Menes; and this line tallies with the fragmentary lists from other sources, showing that this was the official list of recognized sovereigns in regular succession. Eight reigns in a century would, by the analogy of history in long periods, be a large allowance. But even an average of ten reigns in a century would require the whole time from Sethos I., back to the Flood of our common chronology, to dispose of the seventy-six predecessors of that king; and when we arrive at Menes, we find already an empire consolidated into distinct governments, and capable of building the great city of Memphis, with its magnificent temples and towers, and its huge dyke which turned the course of the Nile. Either, then, we must place the Flood much farther back upon the chronological scale, or must admit not only that it was not universal in territorial extent (which is altogether probable), but that it was

not universal in the destruction of mankind, which would seem to contradict both the letter and spirit of the Sacred Record." *

Mr. George Smith, the decipherer of the seventh tablet of Assyrian history, finds a veritable date, that of the conquest of Babylonia by Kudur-nanhundi, the Eamite, which extends back to B. C. 2280, or nearly to the received date of the Deluge. At this time reigned monarchs in the Euphrates Valley, who founded great cities, reared magnificent temples and palaces, excavated canals, and upon their more durable structures engraved characters which modern ingenuity has been able to interpret.

The ingenious author of "The Genesis of Earth and Man" has forcibly commented upon the difficulties which beset us when we attempt to account for the descent of all mankind from a single pair. The greatest of these difficulties "lies in the fact of our finding upon Egyptian monuments, mostly of the thirteenth, fourteenth, and fifteenth centuries before the Christian Era, representations of individuals of numerous nations, African, Asiatic, and European, differing in physical characteristics as widely as any equal number of nations of the present age that could be grouped together; among these being negroes of the true Nigritian stamp, depicted with a fidelity as to color and features, hardly to be surpassed by a modern artist. That such diversities had been produced by natural means in the interval between that remote age and the time of Noah, probably no one versed in the science of anatomy and physiology will consider credible."

Mr. Alfred Wallace, whose keen powers of observation as a naturalist, and whose comprehensive range as

* J. P. Thompson, "Man in Genesis and Geology," p. 100.

a philosopher have so essentially enlarged the boundaries of our knowledge of Natural History, has undertaken to reconcile the conflicting opinions of the two parties; the one who holds that man is a species, and essentially one, and that all differences are but local and temporary variations, produced by the different physical and moral differences by which he is surrounded; the other, that man is a genus of many species, each of which is unchangeable, and has ever been as distinct, and even more distinct, than we now behold him. These differences, he thinks, are due to natural selection; and whilst he believes in the unity of the race, "the best of the argument is on the side of those who maintain the primitive diversity of man."*

In the expression of these opinions he coincides with Sir Charles Lyell, the Gamaliel of the present generation of physicists, at whose feet we have all been content to sit and receive lessons in geology and the kindred sciences. "So long," says Sir Charles, "as physiologists continue to believe that men had not existed on the earth above six thousand years, they might, with good reason, withhold their assent from the doctrine of a unity of origin of so many distinct races; but the difficulty becomes less and less, exactly in proportion as we enlarge our ideas of the lapse of time during which different communities may have spread slowly and become isolated, each exposed for ages to a peculiar set of conditions, whether of temperature, or food, or danger, or ways of living. The law of the geometrical rate of the increase of population, which causes it always to press hard on the means of subsistence, would insure the migration, in various directions, of offshoots from the society first formed, abandoning the area

* "Anthropological Review," May, 1864.

where they had multiplied. But when they had gradually penetrated to remote regions by land or water — drifted sometimes by storms or currents in canoes to an unknown shore,—barriers of mountains, deserts, or seas, which oppose no obstacle to mutual intercourse between civilized nations, would insure the complete isolation of tens of thousands of centuries of tribes in a primitive state of barbarism."*

Mr. Darwin in his work, "The Descent of Man," has devoted a chapter † to the discussion of this question, which is marked by that extensive knowledge of facts, and that power of philosophical analysis which are characteristic of all the speculations of this distinguished naturalist.

He commences by applying to the races of men, those generally-admitted principles which naturalists make use of in determining among the lower orders whether two or more allied forms ought to be ranked as species or varieties,—such as the amount of difference between them, and whether such differences relate to a few or many points of structure, and whether they are of physiological importance; but more especially whether they are constant. "There is no doubt," he remarks, "that the various races, when carefully compared and measured, differ very much from each other, as in the texture of the hair, the relative proportions of all parts of the body,‡ the capacity of the lungs, the form and capacity of the skull, and even the convolutions of the brain; § but it would be an endless task to specify the

* "Antiquity of Man," p. 386.

† Vol. i., chap. vii.

‡ See "Military and Anthropological Statistics of American Soldiers," by Dr. B. A. Gould, pp. 298-358.

§ Marshall, "Account of the brain of a Bush-woman," in Philosophical Transactions, 1864, p. 519.

numerous points of structural difference. The races differ also in constitution, in acclimatization, and in liability to certain diseases. Their mental characteristics are likewise very distinct; chiefly as it would appear in their emotional, but partly in their intellectual, faculties. Every one who has had the opportunity of comparison, must have been struck with the contrast between the taciturn, even morose aborigines of South America and the light-hearted, talkative Negroes. There is nearly a similar contrast between the Malays and Papuans,* who live under the same physical conditions and are separated from each other only by a narrow space of sea. . . .

"If a naturalist were to compare a Negro, Hottentot, Australian, or Mongolian, he would at once perceive that they differed in a multitude of characters, some of slight, and some of considerable, importance. On inquiry he would find that they were adapted to live under widely-different climates, and that they differed somewhat in bodily constitution and mental disposition. If he were then told that hundreds of similar specimens could be brought from the same countries, he would assuredly declare that they were as good species as many to which he had been in the habit of affixing specific names. This conclusion would be greatly strengthened as soon as he had ascertained that these forms had all retained the same character for many centuries; and that negroes apparently identical with existing negroes, had lived at least 4,000 years ago. He would also hear from an excellent observer, Dr. Lund, that human skulls found in the caves of Brazil, entombed with many extinct mammals, belonged to the same type as that now prevailing throughout the American continent.

* Wallace, "The Malay Archipelago," vol. ii, p. 178.

"Our naturalist would then, perhaps, turn to geographical distribution, and he would probably declare that forms differing not only in appearance, but fitted for the hottest and dampest or driest countries, as well as for the Arctic regions, must be distinct species."

By way of illustration, Mr. Darwin proceeds to show that among the Quadrumana, the group next to man, no one species has been able to resist a low temperature or any considerable change of climate; that the different races of man, as first pointed out by Agassiz, are distributed over the world in the same zoological provinces as those inhabited by undoubtedly distinct species and genera of mammals; that this is the case with the Australian, Mongolian, and Negro races; in a less well-marked manner with the Hottentots; but plainly with the Papuans and Malays, who are separated, as Mr. Wallace has shown, by nearly the same line which divides the Malayan and Australian zoological provinces; and that the Esquimaux, like other Arctic animals, extend round the whole Polar regions.

Mr. Darwin then calls attention to the fact, that, as among the domestic animals certain external parasites attach to different species, so among the human races. According to Mr. Murray,* the Pediculi, which attach themselves to the different races of man, differ not only in color, but in the structure of their claws and limbs. The Pediculi which infest the bodies of the Sandwich Islanders, when domiciled on the bodies of English sailors, died in the course of three or four days. This might be urged as an argument that the races themselves ought to be classed as distinct species.

Mr. Darwin next proceeds to show, that, according to Professor Broca and others, some races are quite fer-

* "Transactions Royal Society of Edinburgh," vol. xxvi, p. 567.

tile when brought together, that, contrary to an opinion extensively propagated, mulatto families, according to Dr. Bachman,* which have intermarried for several generations, have continued as prolific as either pure blacks or pure whites; and Sir Charles Lyell, from personal inquiries when in this country, arrived at the same conclusion. Lessened fertility and vitality do not necessarily accompany one another, as seen in the common mule; so that the perfect fertility of the intercrossed races of man, if established, would not absolutely preclude us from ranking them as distinct species.

"On the other side of the question," argues Mr. Darwin, "if our supposed naturalist were to inquire whether the forms of man kept distinct, like ordinary species, when mingled together in large numbers in the same country, he would immediately discover that this was by no means the case. In Brazil he would behold an immense mongrel population of Negroes and Portuguese: in Chiloe and other parts of South America he would behold the whole population consisting of Indians and Spaniards blended in various degrees: in many parts of the same continent he would meet with many of the most complex crosses between Negroes, Indians, and Europeans; and such triple crosses afford the severest test, judging from the vegetable kingdom, of the fertility of the parent forms. . . . Hence, the races of man are not sufficiently distinct to co-exist without fusion; and this it is which, in all ordinary cases, affords the usual test of distinctiveness."

Mr. Darwin next proceeds to show that the distinctive characters of every race are variable; that the negro slaves in Brazil, imported from every part of Africa,

* "An Examination of Professor Agassiz's sketch of natural provinces of the animal World," p. 44.

are not uniform in character; that the Hottentot women offer certain strongly-marked peculiarities, but that these are not of constant occurrence; that in several American tribes, color and hairiness differ considerably; that the shape of the skull varies much in some races; and that so far as relates to other characteristics, they graduate into each other, so that at this day comparative physiologists are disputing whether man should be classed as one species or race, or many, all the way up to sixty-three. That notwithstanding these differences, yet if the whole organization be taken into consideration, they are found to resemble each other so closely in a multitude of points that it is extremely improbable that they should have been independently acquired by aboriginally distinct species or races.

"Of all the differences between the races of man," continues Mr. Darwin, "the color of the skin is the most conspicuous and best marked. Differences of this kind, it was formerly thought, could be accounted for by long exposure under different climates, but Pallas first showed that this view is not tenable, and he has been followed by almost all anthropologists. The view has been rejected chiefly because the distribution of the variously-colored races, most of whom must have long inhabited their present homes, does not coincide with corresponding differences of climate. Weight must also be given to such cases as that of the Dutch families who, as we hear on excellent authority, have not undergone the least change of color, after residing for three centuries in South Africa. The uniform appearance in various parts of the world of gypsies and Jews, though the uniformity of the latter had been somewhat exaggerated, is likewise an argument on the same side. A very damp or a very dry atmosphere has been sup-

posed to be more influential in modifying the color of the skin than mere heat; but as D'Orbigny in South America, and Livingstone in Africa, arrived at diametrically opposite conclusions with respect to dampness and dryness, any conclusion on this head must be considered very doubtful."

The well-attested fact of the immunity of the negro from yellow fever seems to be partly inherent, depending on some unknown peculiarity of constitution, and partly on the result of acclimatization, but in no degree connected with the color of his skin.

While Mr. Darwin infers that the characteristic differences between the races of men cannot be accounted for in a satisfactory manner by the direct action of the conditions of life, nor by the effects of the continued use of parts, nor through the principle of correlation, he would rather look to Sexual Selection as the important agency.

After having shown, by historical references, that with the lowest savages, the people of each tribe admire their own characteristic qualities — the shape of the head and face, the squareness of the cheek-bones, the prominence or depression of the nose, the color of the skin, the length of the hair on the head, the absence of the hair on the face and body, or the presence of a great beard, etc., — he infers that "such points could hardly fail to be slowly exaggerated from the more powerful and able men in each tribe, who would succeed in rearing the largest number of offspring, having selected during many generations as their wives the most strongly-characterized, and therefore the most attractive women. For my own part, I conclude that of all the causes which have led to the differences in external appearance between the races of man, and to

a certain extent between man and the lower animals, Sexual Selection has been by far the most efficient."*

Upon the question of the unity of the human race, the opinions of Humboldt, a man whose long scientific career was unfettered by the dogmas of the past, who was always ready to hail every new discovery, and whose extended travels brought him in contact with the most intellectual as well as the most abject individuals of his species,— the opinions of such a man are not to be lightly disregarded by the comparative physiologist.

"As long as attention," he remarks, "was directed solely to the extremes in the varieties of color and of form, and to the vividness of the first impression of the senses, the observer was naturally disposed to regard races rather as originally different species than as mere varieties. The permanence of certain types in the midst of the most hostile influences, especially of climate, appeared to favor such a view, notwithstanding the shortness of the interval of time from which the historical evidence was derived. In my opinion, however, more powerful reasons can be advanced in support of the theory of the unity of the human race, as, for instance, in the many intermediate gradations in the color of the skin and in the form of the skull, which have been made known to us in recent times by the rapid progress of geographical knowledge — the analogies presented by the varieties in the species of many wild and domesticated animals,— and the more correct observations collected regarding the limits of fecundity in hybrids. The greater number of the contrasts which were formerly supposed to exist have disappeared before the laborious researches of Tiedemann on the

* "Descent of Man," vol. ii, p. 367.

brain of Negroes and Europeans, and the anatomical investigations of Vrolik and Weber on the form of the pelvis. On comparing the dark-colored African nations, on whose physical history the admirable work of Prichard has thrown so much light, with the races inhabiting the islands of the South Indian and West Australian Archipelago, and with the Papuas and Alfourous, we see that a black skin, wooly hair, and a negro-like cast of countenance are not necessarily connected together. So long only as a portion of the earth was known to the western nations, partial views necessarily predominated, and tropical heat and a black skin consequently appeared inseparable."*

He then quotes approvingly the following passage from Johannes Müller's "Philosophy of Man";

"The different races of mankind are forms of one sole species, by the union of two of whose members descendants are propagated. They are not different species of a genus, since in that case, their hybrid descendants would remain unfruitful. But whether the human race have descended from several primitive races of men, or from one alone, is a question which cannot be determined by experience."

Again Humboldt remarks: "Whilst we maintain the unity of the human species, we at the same time repel the depressing assumption of superior and inferior races of men. There are nations more susceptible of cultivation, more highly civilized, more ennobled by cultivation than others—but none in themselves nobler than others. All are in like degree designed for freedom; a freedom which in the ruder conditions of society belongs only to the individual, but which in the social states enjoying political institutions, appertains as a right to the whole community."

* "Cosmos," vol. i, p. 362.

He then proceeds to quote from his hardly less illustrious brother, the following noble sentiments as to the unfulfilled aspirations and ultimate hopes of man:

"If we could indicate an idea which throughout the whole course of history, has ever more and more widely extended the empire, or which more than any other, testifies to the much contested and still more decidedly misunderstood perfectibility of the whole human race, it is that of establishing our common humanity—of striving to remove the barriers which prejudice and limited views of every kind have erected amongst men, and to treat all mankind without reference to religion, nation, or color, as one fraternity, one great community, fitted for the attainment of one object,—the unrestrained development of the physical powers. This is the ultimate and highest aim of society, identical with the direction implanted by nature in the mind of man towards the indefinite extension of his existence. He regards the earth in all its limits and the heavens as far as his eye can scan their bright and starry depths, as inwardly his own, given to him as the objects of his contemplation, and as a field for the development of his energies. Even the child longs to pass the hills or the fields which enclose its narrow home; yet when his eager steps have borne him beyond those limits, he pines, like the plant, for his native soil; and it is by this touching and beautiful attribute of man—this longing for that which is unknown, and this fond remembrance for that which is lost—that he is spared from an exclusive attachment to the present. Thus deeply rooted in the innermost nature of man, and even enjoined upon him by the highest tendencies,—the recognition of the bond of humanity becomes one of the noblest leading principles in the history of mankind."*

* "Cosmos," vol. i, p. 368.

CHAPTER XII.

CHRONOMETRIC MEASUREMENTS APPLIED TO THE ANTIQUITY OF MAN.

IN tracing back the Antiquity of Man to the earliest monuments which indicate his presence on the earth, the Historic Period forms but an inconsiderable part in the great cycle of events. When we read in Herodotus, the oldest of European historians, of populous nations organized under stable governments, and possessed of a knowledge of the arts which, in many respects, we have failed to improve upon, and when we reflect that the origin of these nations goes back of all authentic tradition, we feel that there is a void in human history which will forever baffle our researches to penetrate. To use the simile of Sir Isaac Newton, "we are like children playing upon the sea-shore, picking up here and there a smoother or a prettier shell," while beyond stretches out an expanse over which hang clouds and impenetrable darkness.

The history of man, as measured by any chronometric scale at our command, is exceedingly vague; as much so as if the geometrician were to attempt to calculate the dimensions of a pyramid from the form of its apex, without knowing the length of its base or its perpendicular height. Whilst its angles may be maintained, its expansion downward is an unknown quantity.

There are, however, certain tests which may be applied in determining the relative antiquity of certain events in human progress, which I will proceed briefly to discuss.

Antiquity of the Mound-builders.—It is evident that the works of these people were constructed long after the region which they occupy had assumed its present topographical features, and that nearly the same conditions of soil and climate prevailed as are manifested at the present time. The lapse of a few thousand years is all the time required to cover the most ancient of their structures; and in attempting to estimate that antiquity, I am governed, perhaps, as much by the evidences which they have left of their proficiency in art, as by physical considerations.

Civilization is a plant of slow growth. Among a people cut off from commercial intercourse and subjected, generation after generation, to the same aspects of nature, the increment would be very slow. I have seen growing in the crevices of the rocks which gird to so great an extent the shores of Lake Superior, a spruce tree whose trunk was no thicker than one's thumb, in which, when cut in cross section, the observer, aided by a microscope, could detect annular rings which would imply a lapse of time equal to a generation of men. There it struggled year after year, to maintain a precarious existence; feebly fructifying, during the short-lived summer, and taking in just sufficient of sustenance to prolong its life during the Arctic interval.

So I have thought it has been with human progress. To undertake to estimate that progress as manifested at this day, when by reason of steamships and railways, almost every region of the earth is laid open to human enterprise, when machinery is silently performing what

would be the labor of many millions of men, and when the inventions and discoveries of one nation become almost at once the common property of mankind,—would be, as applied to the past, no safe criterion.

The Chinese, with their non-intercourse policy, are not probably farther advanced in civilization at this time than in the days of Confucius.

Such a civilization as that indicated by the ruins of Central America, was the growth of many centuries, and yet these ruins, I am disposed to believe, are more recent than the mounds of the Mississippi Valley. To some of the evidences of their antiquity I will now direct attention.

Inferences drawn from the condition of skeletons form no reliable guide as to the lapse of time in which they have lain in the earth. Their condition depends, to a great extent, on the mechanical texture of the soil, and the presence or absence of antiseptic properties held in chemical solution by the filtrating waters. I may remark, however, that where the bodies were deposited in the Löess, the bones are far better preserved than where the sandy loam of the river-bottoms forms the enclosing material. The crania recovered from the former deposit have a good degree of consistency, except that the gelatinous matter has leached out; but those recovered from the latter, are so far gone in decay, that the utmost precautions must at once be resorted to, such as applying a solution of glue or melted spermaceti, to prevent their crumbling. Mastodon bones, however, of a much older date, recovered from peat swamps, have so much of the gelatinous matter yet remaining in them, that a nourishing soup might be extracted.

Sir John Lubbock, in speaking of the Swiss-lake habi-

tations and the relics found in their midst, which are supposed to have an antiquity varying all the way from 4,000 to 7,000 years, remarks that "when for the first time I saw them through the transparent water — the remnants of piles with fragments of bone, horn, and pottery lying among them, — a momentary feeling of doubt as to their age rose in my mind. So fresh are they, and so unaltered, they look as if they were only things of yesterday, and it seems hard to believe that they can have remained there for centuries." *

So, too, upon bones invested with stalagmite, we can imagine the lapse of centuries would have no perceptible effect.

The human skeleton, found in the solid limestone on the island of Guadaloupe, is probably of very recent origin, inasmuch as the materials of this limestone are made up of fragments of sea-shells and corals, cast upon the shore by the retiring waves containing a cement in the form of carbonate of lime, which rapidly consolidates.

The character of the arborescent vegetation found covering the works of the Mound-builders may be taken to some extent, but not absolutely, as a chronometric scale in estimating the time which has elapsed since their abandonment. This vegetation in character and in development differs in no respect from that of the surrounding forest. When, therefore, we see growing upon the mounds trees whose annular rings indicate an age of four or five centuries, and the decaying trunks of others which flourished on the same sites, and have perished from natural causes, we are justified in inferring that these works could not have been occupied within the period of six or eight centuries; but as to the time when they were abandoned we have no certain criterion to guide us.

* "Pre-historic Times," p. 184.

Schoolcraft has erroneously assumed that the age of these trees marks the entire lapse of time which has intervened since the happening of that event. Thus, in reference to the antiquity of the great mound at Grave Creek, he remarks; "The cortical layers, counted in the mature and heavy forest trees, denoted its completion to have been at, or soon after, the twelfth century, but there is no proof that it had been commenced centuries earlier." And again; "These data indicate parts of the twelfth and thirteenth centuries as the active period of tumult among the Mississippi Valley tribes."*

While I have not made the study of the longevity of our forest trees a specialty, I had, from general observation, arrived at the conclusion that five or six centuries would mark the extreme age of those species ordinarily found growing on the mounds and on the rubbish heaps thrown up in mining operations, and that there was no evidence to disprove the belief that successive generations of trees might not have sprung up, flourished, and died on the same sites. To test the correctness of my own conclusions in this matter, I applied for information to our distinguished botanist, Dr. Asa Gray, and from his letter in response I make the following extracts:

"There is no sense at all, that I see, in Schoolcraft's notion that the age of the trees now growing on the mounds is a measure of the time which has elapsed since their abandonment. All it tells is, that they were already abandoned when these trees began to grow; quite as likely that one, two, or more generations of these same trees grew there before the present ones necessarily flourished and decayed. Also, they may

* "History and Condition of North American Indians," vol. v, p. 61.

have been preceded by other trees of other species, and that without involving any sensible change of climate, just as we see pines succeed oaks, and *vice versa*. This occurs after a wholesale destruction of a tree-growth at a given locality, to be sure; but that may have occurred through fires, and these may have repeatedly swept the ground at any station, either through human agency or the action of the elements without it. Hemlocks are not long-lived trees, and balsam-firs still less; but what we see on any hill-side in untouched hemlock and fir-woods, decayed and decaying trunks under foot, and trees of various ages overhead, slowly dying off one by one, toppled by winds, and younger ones now getting a better chance, taking their place, to fall in their turn; just this, I suppose we might have seen four or six hundred, or perhaps a thousand years ago, had we been there to see.

"Many species of trees may be said to have a certain average attainable age, answering to our 'threescore and ten,' but just as some of our race, 'by reason of strength' and 'good luck,' may much exceed that limit, so may any given tree."

Trees, then, growing upon the mounds, by the number of cortical layers displayed in their trunks, do not afford a chronometric scale by which to estimate the absolute lapse of time since their abandonment.*

* Since the text was prepared, I have received, in response to my inquiries, the following valuable communication from Dr. I. A. Lapham, of Milwaukee:

AGE OF FOREST TREES IN WISCONSIN.—By placing the edge of a sheet of paper across a newly-felled tree, in the direction of the radius, one may with a sharp pencil mark the thickness of the several annual rings of growth; and by measuring a number of such rings we may find the average increase of wood each year. It was thus that the items were collected for the following table, showing the number of rings measured,

Indian traditions.— Little credence is to be attached to Indian traditions; and yet so far as those traditions go, they are to the effect that the Mound-builders were

their aggregate width, the average annual growth thus found, and the number of years required for an increase of one foot in diameter, of a number of our common forest trees:

GROWTH OF NATIVE FOREST TREES OF WISCONSIN.

Names.	No. of rings measured.	Width in inches.	Growth in one year, inches.	No. of years for one foot of growth.
Basswood (*Tilia Americana*)	94	5.70	.1212	99
Sugar Maple (*Acer saccharinum*)	83	2.45	.1166	103
Wild Cherry (*Prunus serotina*)	44	2.03	.0922	130
White Ash (*Fraxinus Americana*)	172	10.09	.1172	102
Elm (*Ulmus Americana*)	179	9.45	.1056	114
White Oak (*Quercus alba*)	160	9.00	.1124	107
Burr Oak (*Quercus macrocarpa*)	12	0.60	.1000	120
Red Oak (*Quercus rubra*)	62	6.90	.2226	54
Beech (*Fagus ferruginea*)	160	9.45	.1180	102
Yellow Birch (*Betula excelsa*)	20	1.28	1280	94
White Pine (*Pinus strobus*)	60	5.40	.1800	67
Hemlock (*Abies Canadensis*)	42	3.72	.1770	68
Tamarack (*Larix Americana*)	192	12.95	.1344	89
White Cedar (*Thuja occidentalis*)	82	4.00	.0976	123
[Fossil wood, Pike's Peak, *Coniferæ*]	83	8.80	.2120	56½
Mean (omitting the last)				98

A more thorough and systematic investigation of the annual growth of trees would lead to results of greater certainty; but the measurements already made and embodied in this table are sufficient to show that there cannot be any great age assigned to the average trees of our present forests.

It will be seen that it requires the lapse of from fifty-four to one hundred and thirty years for trees to increase their diameter one foot, and with the average of the trees measured the time is less than one hundred years. Three or four feet diameter is a large tree: few exceed that size; and hence we may infer that few of the trees now growing in Wisconsin can antedate the discovery of this continent by Columbus. An occasional tree exceeds these dimensions but they are exceedingly rare. Perhaps the largest and oldest tree in the State is the one noted by the Government surveyor near Manitowoc, a white cedar twenty-two feet in circumference. By the table it will be seen that this tree is one of the slowest growth, requiring one hundred and twenty-three years to

a distinct race from themselves. Whilst the Indians are notoriously superstitious and invent legends which they attach to almost every unusual aspect of nature, with regard to the origin of the mounds their statements are uniform, that their antiquity reaches back to a period beyond the memory of their ancestors who saw them as they see them, reposing in an unbroken solitude, and shaded by an apparently primeval forest. I would not make these traditions the basis of an argument for the high antiquity of these works; for among a people who have no written language, the lapse of a few generations would obliterate all knowledge even of the most signal events.*

add one foot to its diameter. Seven times this quantity, or eight hundred and sixty years, is therefore the age of this exceptionally large tree.

Further south, where trees attain a larger size, they have had, at the same time, owing to the more genial climate and more fertile soil, a much more rapid growth, so that they probably do not exceed the trees of Wisconsin in age.

There can be no means of determining how many successive forests may have preceded the present, and occupied the soil since any given epoch, as that of the Mound-builders — all traces of the former trees having been long since effaced. A few years suffice to convert a fallen trunk into humus that cannot be distinguished from the other portions of the accumulating soil.

Having recently had an opportunity of examining some fossil wood of the so-called petrified forest near Pike's Peak, Colorado, brought home by Mrs. L. E. Hewitt, whose beautiful paintings of the Alpine scenery of that region are so much admired, I am able to compare the growth of the Coniferous wood of Tertiary times with that of the present day. It will be seen that the growth was then equal to the more rapid-growing trees of our own times. The remains of the base of one of these ancient fossil trees was measured, and found to have a circumference of fifty-nine feet, almost equal to that of the largest of the big trees of California. The time required for the growth of this tree, supposing the section measured to be an average of the whole, was more than a thousand years.

* Sir John Lubbock ("Pre-historic Times," p. 425) has shown that the New Zealanders, when visited by Captain Cook, had no knowledge of

The gorge of Niagara.— This gorge, in the rate of its excavation, since first observed by Hennepin, affords data for approximately estimating the length of time which has elapsed since the region assumed nearly its present topographical features, or rather, perhaps, since existing causes began to operate.

Professor James Hall * was the first to discuss the phenomena here exhibited, and subsequently Sir Charles Lyell, Desor, Hitchcock, and other geologists passed over the same field; and while they all agree as to the immense period required to excavate this gorge, as compared with the Historic Epoch, they differ widely as to the chronometric scale to be applied.

The present position of the Falls is six and one-half miles from Lake Ontario, at Lewiston. Through the whole of this distance the river is confined within a rocky gorge three hundred feet deep at its mouth, and one hundred and sixty feet, where the cataract leaps over the ledge. The formations cut through are the Niagara limestone, forming the rim, and the least destructible of the series; the Clinton group; and the Medina sandstone. The dip of the strata is about fifteen feet to the mile, up stream, or in the direction of Lake Erie. The present scarp of the Falls is made up of eighty feet of limestone, with about the same thickness of shale beneath; and the process of excavation is accomplished by the eddying waters undermining and carrying away the friable shales, so that the incumbent

Tasman's visit, which occurred less than one hundred and thirty years before. The Indians of the Mississippi Valley, after the lapse of a few generations, had lost all tradition of De Soto's expedition, which must have impressed their ancestors with dread at the sight of horses ridden by men, and the sound of fire-arms which they must have likened to thunder.

* "Geology of the Fourth District of New York," p. 389.

limestone, deprived of support, plunges into the chasm in large masses.

On both sides of the Whirlpool, three miles below the Falls, and also on Goat Island above, there are deposits of Modified Drift, containing fresh-water shells such as Unios, Melanias, and Paludinas—forms which are common to the still waters near the lake, but which are not found in the rapid waters of the river. In this connection was found a tooth of the common mastodon, *M. giganteus*. These facts indicate that this deposit was formed in comparatively quiet waters, and at a time when the topographical features were different from what are now observed. It is evident, therefore, that the present channel of the river has been excavated since the epoch of the Modified Drift, which forced the waters to find an outlet over their present rocky bed, instead of accommodating themselves to the more readily-yielding Drift materials.

Over a rocky plateau, then, the Falls have been receding since the epoch of the Modified Drift, until they have now reached a distance of six and one-half miles from the debouche into Lake Ontario. Hall and Lyell estimated the recession at the average rate of a foot a year, but Desor inferred that it was more nearly three feet a century than three feet a year. Taking the estimate of the former, the lapse of time since the Falls commenced their recession from Lake Ontario, would amount to more than 31,000 years; and the estimate of the latter would require 380,000 years.* At all events, the Historic Era forms but an inconsiderable portion in the duration of time since the deposit was thrown down, in which the remains of the mastodon were entombed.

* "Les Cascades du Niagara, par E. Desor." Neuchatel, 1854.

Astronomical changes within the Human Period.— That there have been cycles of heat and cold in our earth's history, within the Human Period, and embracing long durations of time; is attested by many geological monuments. Physicists, at this day, in speculating on the causes of these cycles, are disposed to trace them to an astronomical, rather than a telluric origin. To these views I directed attention on another occasion.*

We are assured that ours is not a central sun, but one in the great procession of stars which is sweeping towards the constellation Hercules; and that in the region of ether there are spaces which are comparatively barren of stars, while in others they are thickly clustered. Now every star is a sun, emitting light and heat, a portion of which is transmitted to us. Our planet at this time is moving through one of those starless spaces, and therefore is not in a position to receive the full influence of such a cause. The distinguished Swiss botanist Heer, to whom we are so largely indebted for our knowledge of the semitropical character of Miocene flora, has suggested that it is to this source, rather than telluric causes, we are to resort to explain the varying distribution of temperature as manifested in past geological times. But to this view objections have been raised,—that to produce glaciers, heat, as well as cold, is required. "It is perfectly manifest," remarks Professor Tyndall, "that by weakening the sun's action, either through a defect of emission, or by steeping of the entire solar system in space of a low temperature, we shall be cutting off the glaciers at their sources." †

* Address on retiring from the Presidency of the American Association for the Advancement of Science: Nineteenth Meeting (Troy), 1870.

† "Heat considered as a Mode of Motion."

Again: Have we the right to assume that, throughout all past ages, the poles of our planet have pointed in the same direction? We can conceive that, if its axis were to form with the plane of the ecliptic, the same angle which it now forms with the equatorial plane, there would ensue an entire change of climate, and consequently of organic forms. Why should the astronomer insist on the immutability of the sidereal system, when to the geologist is unfolded a record of seas displaced and continents elevated; of great cycles of heat and cold; of the disappearance of old and the appearance of new forms of organic life? Change, not constancy, is inscribed on every leaf in the volume of Nature.

The speculations of the French savant, Adhémar,* in explanation of these phenomena, are not to be overlooked, based as they are on the precession of the equinoxes and the movement of the apsides,—a movement which, I believe, was unknown to the elder astronomers. If we compare the movement of the earth with the stars, it requires the lapse of 25,000 years to bring the equinox to correspond with the same point in space it now occupies; but the orbit itself being movable, this period is reduced to about 21,000 years. This is called the Great Year, being the measure of time before the winter solstice will exactly coincide with the perihelion, and the summer solstice with the aphelion, and before the seasons will again harmonize with the same points of the terrestrial orbit.†

* "Revolutions de la Mer," J. Adhémar.

† "The mean value of the precession of the equinoxes on the fixed ecliptic, and also on the apparent ecliptic, in a Julian year, is equal to 50."438239; whence it follows that the equinoxes perform a complete revolution in the average interval of 25,694.8 years; but on account of the secular inequalities in their motion, the time of their revolution is

The earth at this time approaches nearest the sun in the northern hemisphere during autumn and winter, and it is only when it recedes the farthest from the source of heat that the northern hemisphere receives the full effect of its vivifying warmth. As the earth between the vernal and autumnal equinox traverses a longer circuit than during the other half of the year, and also experiences an accelerated movement as it draws near the sun, the result is, that the northern summer is longer than the southern by about eight days; but after the lapse of 10,500 years these conditions will be reversed. It was in the year 1248, according to M. Adhémar, that the Great Northern Summer culminated, since which time it has continued to decrease, and that decrease will go on until the year 11748, when it will have attained its minimum.

This compound movement, the precession of the equinoxes and the shifting of the line of the apsides, it is claimed, exerts a marked influence on the earth's temperature. While the Great Winter prevails at the north pole, the refrigeration is so excessive that the heats of summer are insufficient to melt the snow and ice precipitated during the winter, and hence, year after year, and century after century, they go on accumulating, until the Circumpolar region is in a state of glaciation, and the added weight becomes sufficient to displace the centre of gravity, which would be equivalent to a subsidence at one pole and an elevation at the other. M. Adhémar has even calculated the extent of this movement, and states that it would amount to about 5,500 feet. Now let it be borne in mind that Professor

not always the same, but may differ from the mean time of revolution by 281.2 years." (Stockwell, on "Secular Variations," xii. "Smithsonian Contributions.")

Ramsey has shown that in Wales the submergence of the land during the Drift Epoch amounted to 2,300 feet, and our own observations show that in the northern portions of the United States the glacial action proper can be traced to the height of 2,000 feet, although there were mountains which served as radiating centres, on whose flanks glacial action may be traced much higher. These geographical points, roughly estimated, are about midway between the equator and the pole, and the extent of the subsidence would correspond very well with the conditions of this theory.

In the year 1248 the Great Winter terminated at the south pole, where for 10,500 years the accumulation of snow and ice had been going on, attended with the phenomena which we have described. "Here, then," says M. Julien, an advocate of this theory, "is an irresistible force, which, following the invariable law of the irregular precession of the equinoxes, must make the earth's centre of gravity periodically oscillate."

As evidences of the shifting of vast amounts of water from one pole to the other, the advocates of this theory point to the marked differences in the topographical features of the two hemispheres. In the Austral region we meet with projecting headlands and peninsula-like terminations of continents, and groups and chains of islands in the Pacific and Indian Oceans extending over vast areas, which rise up like the peaks and crests of mountains. These are the evidences of a gradually engulfed hemisphere. In the Boreal region we have wide expanses of land diversified by mountains, prairies, and plains; elevated sea-beaches and river-terraces, most conspicuously displayed on the borders of the Arctic Sea; vast oceanic shoals; a marine fauna of a northern type preserved in beds 1400 feet above the

ocean level; clusters of lakes yet retaining their bitter waters; shallow seas once salt, but each decade becoming more brackish; vast desert tracts which up to a recent time formed the ocean-bed;—all these phenomena, of which man has been the witness, indicate a hemisphere gradually emerging from the waters. Perhaps the physicist can discern in these great periodic oscillations, the method by which Nature perpetually renews the youth of our planet, and maintains its fertility.

Sir Charles Lyell does not think that this change, which he claims could hardly produce more than a difference of half a degree between the cold of the present winter and that of 1248, would be appreciable, and adds that the whole effect which can be produced by secular astronomical changes must always be subordinate to geographical conditions; and Sir John Herschel is very far from supposing it competent to account for so great an alteration. The effect, however, increases with the excentricity of the earth's orbit, which shows variations, within the last million of years, sufficient to produce marked changes of climate. Mr. Croll, in a series of papers in the "Edinburgh New Philosophical Magazine," has elaborately discussed this question, and, in connection with Mr. Stone, has calculated that excentricity for the last million of years. He infers that a glacial period occurs when the excentricity is at its maximum, and the solstices fall when the earth is *in perihelio* and *in aphelio;* and that only one hemisphere has a glacial climate at the same time, which occurs when the winter is *in aphelio.* Mr. John Carrick Moore published a little work a few years ago, in which, adopting the table of Croll as to the excentricity of the earth's orbit, he added its difference of distance in millions of miles from the sun; the number of days by

which winter, occuring in aphelion, is longer than the summer in perihelion; the mean temperature of the hottest summer month in the latitude of London when the summer occurs in perihelion; and that of the coldest winter month in the same latitude, when the winter occurs in aphelion.

TABLE *showing the variations in the excentricity of the earth's orbit for a million of years before* A. D. 1800, *and some of the climatal effects of such variations.*

	Number of years before A. D. 1800.	Excentricity of orbit.	Difference of distance in millions of miles.	Number of winter days in excess.	Mean of hottest month in latitude of London.	Mean of coldest month in latitude of London.
	1,000,000	.0151	2¾	7.3	83° F.	21° F.
D	950,000	.0517	9¼	25.1	109°	3°
	900,000	.0102	1¼	4.9	80°	23°
C *a*	850,000	.0747	13⅕	36.4	126°	7°
C *b*	800,000	.0132	2¼	6.4	82°	22°
C *c*	750,000	.0575	10½	27.8	113°	0°6
	700,000	.0220	4	10.2	87°	17°
	650,000	.0226	4	11	88°	16°
	600,000	.0417	7½	20.3	101°9	7°9
	550,000	.0166	3	8	84°	20°
	500,000	.0388	7	18.8	99°	9°
	450,000	.0308	5½	15	94°	13°
	400,000	.0170	3	8.2	84°	20°
	350,000	.0195	3½	9.5	86°	18°
	300,000	.0424	7¾	20.6	102°	7°
	250,000	.0258	4½	12.5	90°	15°
B *a*	210,000	.0575	10½	27.8	113°	0°7
B *b*	200,000	.0567	10¼	27.7	113°	1°9
	150,000	.0332	6	16.1	95°	12°
	100,000	.0473	8½	23	105°	5°
A	50,000	.0131	2¼	6.3	82°	22°
	0	.0168	3	8.1	84°	20°

Mr. Stockwell* has computed the excentricity of the earth's orbit, at intervals of 10,000 years, during a period of 2,000,000 years, by employing the constants which correspond to the assumed mass of the earth increased by its twentieth part, and finds that it will always be included within the limit of 0 and 0.0693888. He explains how the climate can be modified by this excentricity. "At present," he remarks, "the sun is north of the equator scarcely 186½ days, and south of the same circle about 178¾ days; thus making a difference of 7¾ days between the length of the summer and winter; but when the excentricity of the orbit is nearly at its maximum, and its transverse axis also passes through the solstices, both of which conditions have in past ages been fulfilled, the summer in one hemisphere will have a period of 198¾ days, and the winter of only 166½ days, while in the other hemisphere these conditions will be reversed,—the winter having a period of 198¾ days, and the summer of only 166½ days. The variations of the sun's distance from the earth in the course of a year, at such times, are also enormous, amounting almost to one-seventh part of its mean distance,—a quantity scarcely less than 13,000,000 miles."† Perhaps the fluctuations in climate resulting from this cause will account for the presence of the remains of the hippopotamus and African elephant in Europe, and of the megatherium and megalonyx in the lower latitudes of the United States.

Recurring to the table, it will be seen that there are four periods marked A, B, C, D, in which there has

* "Smithsonian Contributions to Knowledge, No. 232." "Memoir on the Secular Variation of the Elements of the Orbits of the Eight Principal Planets," etc., by John N. Stockwell. 1872.

† "Introduction," xiii.

been a large excentricity of the earth's orbit, and consequently attended with excessive variations in the climate. The periods marked A and B, 200,000 and 210,000 years ago, are considered by Mr. Croll and Sir John Lubbock sufficiently remote to embrace all the geological changes, as well as the variations in the range and distribution of aquatic and terrestrial animals since the dawn of the Glacial Epoch; but Sir Charles Lyell would rather go back to the periods marked C and D, representing 800,000 and 950,000 years, as affording the necessary conditions to explain the varying phenomena which characterize the later phases in the physical history of our planet.

APPENDIX.

APPENDIX.

That the reader may comprehend the condition of the inhabitants of the Western Hemisphere when first known to the European, I append extracts from early historians.

A.

CONDITION OF THE INDIANS OF THE ATLANTIC SEA-BOARD.

Cotton Mather, in his Life of Elliot, thus describes their condition: "Know, then, that these doleful creatures are the veriest ruins of mankind which are to be found on the face of the earth. No such estates are to be expected among them, as have been the baits which the pretended converts in other countries have snapped at. One might see among them what an hard master the devil is to the most devoted of his vassals. These abject creatures live in a country full of mines. Among us there lies copper [probably iron pyrites] enough to supply the world, besides other mines to be hereafter explored. But our shiftless Indians were never the owner of so much as a knife till we came among them. Their name for an Englishman was a *knife-man*. Stone was used, instead of metal, for their tools, and for coins they had only little beads with holes in them. . . .

"They live in a country where we now have all the conveniences of human life. But as for them, their housing is but a few mats tied about poles fastened in the earth, where a good fire is their bed-clothes in the coldest seasons. Their clothing is but the skin of a beast, covering their hind parts, their fore parts having a little apron where nature calls for

secrecy. Their diet has not a greater dainty than their *nokehick*, that is, a spoonful of their parched meal, with a spoonful of water, which will strengthen them to travel a day together, except we should mention the flesh of deers, bears, moose, raccoons, and the like, which they have when they can catch them; as also a little fish, which if they would preserve, 't was by drying, not by salting, for they had not a grain of salt in the world, I think, till we bestowed it upon them. . . .

"They live in a country full of the best ship-timber under heaven, but never saw a ship till some came from Europe hither. . . They cross the water in canoes, made sometimes of trees, which they burn and hew till they have hollowed them; and sometimes of barks, which they stitch into a light sort of vessel, to be carried easily overland.

"Their way of living is infinitely barbarous; the men are most abominally slothful, making their poor squaws or wives to plant, and dress, and beat their corn, and build their wigwams for them. . . .

"They 'll continue in a place till they have burnt up all the wood thereabouts, and then they pluck up stakes to follow the wood which they cannot fetch home unto themselves. . . No arts are understood among them, unless just so far as to maintain their brutish conversation, which is little more than is to be found among the very beavers on our streams."

B.

CONDITION OF THE ANCIENT MEXICANS.

Bernal Diaz, who accompanied Cortez in his expedition of the Conquest of Mexico, states that: "On approaching Yucatan, we perceived a large town at the distance of two leagues from the coast, which from its size — it exceeding any town in Cuba — we named Cairo." Upon the invitation of the chief, who came off in a canoe, they went ashore, but were ambuscaded. "Near the place of this ambuscade were three

buildings of *lime* and *stone*, wherein were idols of clay with diabolical countenances." "The buildings of *lime* and *stone*, and the gold, gave us a high idea of the country we had discovered." At another point he speaks of meeting "fifty Indians dressed in cotton mantles," who invited them to their town, having buildings similarly constructed, "with figures of serpents and idols painted upon the walls." Marching towards the capital, and arriving at Cempoal, he was struck "with the beauty of the buildings." Those of the great square "had been lately whitewashed and plastered, in which art these people are very expert," and one of the advanced guard was so struck with the splendor of their appearance in the sun, that he rushed back and told Cortez that the walls of the houses were of silver. As they approached the territory of Mexico, he continues, "appearances demonstrated that we had entered a new country, for the temples were very lofty, and together with the *terraced* dwellings and the houses of the caiques, being plastered and whitewashed, appeared very well and resembled some of our towns in Spain." At Tehuacingo they entered "a strong and spacious temple." Arrived at Cholula, "a city much resembling Valladolid," Cortez sent some men to a "great temple to bring, as quietly as they could, two priests." "One of them was a person of rank and authority over all the temples of the city." As to the City of Mexico, he could compare it to nothing but "the enchanted scenes we had read of in Amadis de Gaul, from the great towers and temples, and other edifices of lime and stone, which seemed to rise up out of the water. . . We were received by the great lords of that country, relations of Montezuma, who conducted us to our lodgings there in palaces magnificently built of stone, the timber of which was cedar, with spacious courts, and apartments furnished with canopies of the finest cotton. The whole was ornamented with works of art, painted, and admirably plastered and whitened, and it was rendered more delightful by numbers of beautiful birds."

The inhabitants of Central America were abundantly supplied with copper implements. When Columbus, in his fourth voyage, was visited at the Guanaja Islands by a trading canoe from Yucatan, the crew, according to Herrara, had "small hatchets made of copper, small bells and plates, *crucibles to melt copper*," etc.

So, too, when the Spaniards, under Cortez, entered Tuspan, they mistook the bright copper or bronze axes of the natives for gold. Bernal Diaz relates that "each Indian had, besides his ornaments of gold, a copper axe, which was very highly polished, with the handles curiously carved, as if to serve equally for an ornament and for the field of battle. We first thought that these axes were made of an inferior kind of gold; we therefore commenced taking them in exchange, and in the space of two days had collected more than six hundred, with which we were no less rejoiced, as long as we were ignorant of their real value, than the Indians with our glass beads."

Dupaix says that the axe-heads, cast of alloyed copper, "are much sought by silversmiths on account of their fine alloy."

C.

CONDITION OF THE ANCIENT PERUVIANS.

When the Spaniards invaded Peru, they found a people far advanced in civilization. The country was developed by a magnificent system of internal improvements. A road, Macadamized or paved with slabs of stone, stretched for more than a thousand miles through the several provinces of the empire, by which an easy and expeditious communication was maintained between the most distant parts. It was marked at regular distances by mile-stones, or some unit of measurement; and at suitable positions were erected station-houses. Deep ravines and rapid rivers were spanned by bridges, sometimes of stone and sometimes of wood or ropes, and the crests of mountains were scaled by long flights of

steps cut in the rock, with resting places provided. As the Peruvians used no wagons, although they had subdued the llama, this arrangement was sufficient. The engineering skill thus displayed, excited the wonder of the conquerors. Sarmiento, who saw the roads of Incas while they were yet in a state of preservation, expresses surprise that a people unacquainted with the use of iron should be able to complete such grand works in so high and rocky a region, extending from Cuzco to Quito on the one hand, and to the coast of Chili on the other. "The Emperor Charles," he adds, "with all his power, could not accomplish even a part of what the well-ordered government of the Incas effected through the obedient people over whom they ruled."

Hernando Pizarro, the brother of the Conqueror, adds, that "in the whole of Christendom, there are nowhere such fine roads as those which we here admire." Humboldt, who saw their ruins, states that nothing he had ever seen of the remains of Roman roads in Italy, in the south of France, and in Spain, was more imposing than these works of the ancient Peruvians.

Aqueducts were constructed to carry water to the caravansaries and to the palaces of the Incas, and also cisterns and reservoirs to furnish water for irrigation. The "princely palaces" were built of hewn stone, and they used for this purpose bronze instruments. They spun and wove cotton and the wool of the alapaca. They were, probably, quite as civilized, and less cruel than their conquerors.

D.

CONDITION OF THE ANCIENT INDIANS OF NEW MEXICO.

The Pueblo Indians of New Mexico probably occupied at the time of the Conquest the frontier posts of the empire of Montezuma.[1] When first known to the Spaniards they were living in towns, cultivating and irrigating the soil. Their vessels of pottery in shape and material correspond very closely with those found in the mounds.

Coronado, who in 1540 invaded the country of Ciboia, in his "Relations" speaks of seeing "great houses of stone," for he adds, "although they be not wrought with turquasses, nor with lime, nor with brick, yet they are very excellent houses of three, or four, or five lofts high, wherein are good lodgings and fair chambers, with ladders instead of stairs, and certain cellars under ground very good and paved. . . In this town, where I now remain, there may be some two hundred houses, all compassed with walls; and I think that, with the rest of the houses which are not so walled, there may be together five hundred." In describing the domestic habits of the people, he remarks: "They have no cotton-wool growing, because the country is too cold, yet they wear mantles thereof, and true it is that there was found within their houses certain yarn made of cotton wool. . . The kingdom of Totonteac is much extolled by the Father Provincial, who said there were wonderful things there, and such great matters, and that they made clothes there."

These extracts clearly show that, in their habits and pursuits, the inhabitants of Central and South America were widely different from those of North America: in the one instance the people had made considerable progress in civilization; in the other they were sunk in brutal barbarism.

E.

THE ATLANTIC THEORY.

"The Story of Atlantis," recorded by Plato in his Tinæus, as communicated to Solon by an Egyptian priest, has, in the light of modern geographical discovery, been generally regarded as a myth; but within a few years it has been revived, and there are not wanting investigators of profound learning who regard it as authentic. The following is the version of the Greek philosopher:

"Among the great deeds of Athens, of which recollection is preserved in our books, there is one which should be

placed above all others. Our books tell that the Athenians destroyed an army which came across the Atlantic Sea and insolently invaded Europe and Asia; for this sea was then navigable, and beyond the strait where you place the Pillars of Hercules, there was an island larger than Asia [Minor] and Libya combined. From this island one could pass easily to other islands, and from these to the Continent which lies around the interior sea. The sea on this side of the strait (the Mediterranean) of which we speak, resembles a harbor with a narrow entrance; but there is a genuine sea, and the land which surrounds it is a veritable continent. In the Island of Atlantis reigned three kings with great and marvelous power. They had under their dominion the whole of Atlantis, several other islands, and some parts of the Continent. At one time their power extended into Libya, and into Europe as far as Tyrrhenia, and, uniting their whole force, they sought to destroy our countries at a blow; but their defeat stopped the invasion and gave entire independence to all the countries this side of the Pillars of Hercules. Afterward, in one day and one fatal night, there came mighty earthquakes and inundations which engulfed the warlike people. Atlantis disappeared beneath the sea, and then that sea became inaccessible, so that navigation on it ceased on account of the quantity of mud which the engulfed island left in its place."

Plutarch, in his life of Solon, relates that when that lawgiver was in Egypt "he conferred with the priests and learned from them the story of Atlantis."

Diodorus Siculus states that: "Over against Africa lies a very great island, in the vast ocean many days' sail from Libya westward. The soil there is very fruitful, a great part whereof is mountainous, but much likewise champaign, which is the most sweet and pleasant part, for it is watered by several navigable streams, and beautiful with many gardens of pleasure, planted by divers sorts of trees and an abundance of orchards. The towns are adorned with stately buildings

and banqueting houses pleasantly situated in their gardens and orchards."

These passages from the ancient classics as to the existence of a Western Continent, coupled with certain traditions to be found in the ancient Mexican records of a great catastrophe, the combined result of earthquakes and inundations, by which a large area in Central America became submerged and a greater portion of the population destroyed, have reopened the discussion whether Plato's "Story of Atlantis" does not belong to the sobrieties of truth. Among the most zealous of these advocates is the Abbé Brasseur de Bourbourg, who has brought out these traditions in his translation of the "Teo Amoxtli,"* which is the Toltecan mythological history of the cataclysm of the Antilles; and the late George Catlin published a little work† in which this theory is vigorously maintained. Among the Indian tribes of North America, Catlin found the tradition of such a cataclysm. The tribes further south relate that the waters were seen coming in waves like mountains from the east, and of the tens of thousands who ran for the high grounds to the west, according to some traditions one man only, and according to others, two, and still according to others, seven, succeeded in reaching places of safety, and from these have descended the present races of Indians.

"The tribes in Central America and Mexico, in Venezuela, and in British and Dutch Guinea, distinctly describe these cataclysms,— one by water, one by fire, and the third by the winds. The tribes nearer the vicinity of the terrible convulsions were cognizant of the whole effects of fire and winds, when the remote tribes were sensible only of the flood of waters which went to the base of the mountains."‡

* "Quater Lettres sur le Mexique," and "Sources de l'Histoire Primitive du Mexique."

† Catlin, "The Lifted and Subsided Rocks of America." London, Trübner & Co., 1870.

‡ Ibidem, p. 145.

From amidst "the thunder and flames that came out of the sea," whilst "mountains were sinking and rising," the terror-stricken inhabitants sought every expedient of safety. Some fled to the mountains, and some launched their rafts and canoes upon the turbulent waters, trusting that a favorable current would land them upon a hospitable shore, and thus in this elemental strife this ancient civilized people became widely dispersed.

The festival of "Izcalli" was instituted to commemorate this terrible calamity, in which "princes and people humbled themselves before the Divinity and besought Him not to renew the frightful convulsions."

It is claimed that by this catastrophe, an area larger than that of the kingdom of France became engulfed, including the Lesser Antilles, the extensive banks at their eastern base, which at that date were vast and fertile plains, the peninsulas of Yucatan, Honduras, and Guatemala, and the great estuaries of the Caribbean Sea and the Gulf of Mexico. With the peninsulas of Yucatan and Guatemala, went down the splendid cities of Palenque and Uxmal, and others whose sites are now in the ocean bed, with most of their living inhabitants; and the Continent has since risen sufficiently to restore many of these ancient sites.

The Abbé Brasseur boldly asserts that he has found proofs that the first civilization of the earth was on the ground which sank in the cataclysm of the Antilles; that the first ceremonial religion commenced there, as well as the first Age of Bronze, which spread over the two hemispheres; and that there we have the beginning and basis of American ethnology.

He appeals to comparative philology to support his views. The words *Atlas* and *Atlantic* have no satisfactory etymology in any language known to Europe. They are not Greek, and cannot be referred to any known language of the Old World.* But in the Nahuatal (or Toltecan) language we find immediately the radical *a*, *atl*, which signifies water, man,

* Molina, "Vocab. en lengua Mexicana y Castellana," etc.

and the top of the head. From this comes a series of words, such as *atlan* — on the border of, or amid the water, — from which we have the adjective *Atlantic*. We have, also, *atlaça* — to combat, or to be in agony; it means also, to hurl or dart from the water, and in the preterit makes *atlaz*. A city named *Atlan* existed when the continent was discovered by Columbus, in the Gulf of Urba, Darien, with a good harbor; but it is now reduced to an unimportant pueblo named *Acla*.

The authority of Charles Martins is appealed to, showing that "hydrography, geology, and botany agree in teaching us that the Azores, the Canaries, and Madeira, are the remains of a great continent which formerly united Europe to North America." *

The Abbé might also have appealed to the authority of Retzius, that the primitive *Dolicocephali* of America, comprehending not only the Caribs of the Lesser Antilles, but the neighboring continent of Venezuela and Guiana, are nearly related to the Guanches in the Canary Islands, and the Atlantic populations of Africa — the Moors, Tuaricks, Copts, etc.

Catlin † asserts that the ruined cities of Palenque and Uxmal have within themselves, the evidences that the ocean has been their bed for thousands of years, and that the earth on which one treads, and the whole face of the country in which they stand, bear incontestable proofs of the same fact. Now, in opposition to this claim to a very remote antiquity, it may be stated that these structures are composed of a soft coralline limestone of a comparatively recent geological formation, probably of the Tertiary period, and upon the structures themselves there are no water-lines, such as would be left by a gradually emerging continent. Besides, to show the comparatively recent origin of these cities, by which I mean since the soil and climate have assumed a nearly unvarying phase, it may be stated that over the doorways of Uxmal, Stevens observed that the lintels were formed of wood, belong-

* "Revue des Deux Mondes," March, 1867.

† Ibidem, p. 154.

ing to a tree which is harder than *lignum vitæ*, many of which were in a perfect state of preservation at the time of his explorations, and this, too, in a climate which is most destructive to all perishable things.

It may be further remarked that the earlier observers of the ruins of Palenque describe structures which have now crumbled to dust, and that in that moist climate, giving birth to a luxuriant vegetation, ready to eliminate whatever of nutrition there may be derived from a perishable limestone, these abandoned cities, since the Spanish Conquest, embracing a period of more than three hundred and fifty years, have assumed to a greater extent the character of undistinguishable ruins. How different from the dry atmosphere of Egypt, which has preserved every touch of the graver's chisel, every shade of the artist's brush, and whose soil is fertilized, not by descending showers, but by the annual inundations of the Nile! Had such a climate reigned there, those monuments, reaching back to the dawn of the Historic Period, would have been undecipherable. The brilliant colors of the paintings, and the texture of the finer handiwork fade and perish when exposed for a generation to the moist climate of Paris or London.

It may be further remarked — a point well taken by M. Claparede,— that the disappearance of so large an area as was embraced in the supposed Atlantis, would have produced a very considerable refrigeration in the climate of the northern hemisphere, attended with a marked change in the flora and fauna, especially in the basin of the Mediterranean,— an event which would have permanently engraved itself upon the memory of the Egyptians.

F.

ANTE-COLUMBIAN DISCOVERIES.

I have purposely declined to discuss the ante-Columbian relations which many conjecture to have existed through the voyages of the Northmen to Vinland, and of the

Welsh, under Prince Madog, to some supposed point in the Southern States, for the reason that if such an intercourse was ever established, these peoples have left behind no memorials. The Runic inscription which the Danish antiquarians profess to recognize on the Dighton rock, is to the American ethnologist but the crude picture-writing of the savage. The alphabetical characters inscribed on the "Grave Creek Stone," and the "Holy Stone of Newark" with its Hebrew letters, which have called out from philologists a wonderful amount of learning, one is disposed involuntarily to associate with the famous stone which served as the basis of Mr. Pickwick's fame.

The "Cincinnati Tablet," which was supposed to bear "a singular resemblance to the Egyptian cartouche," was fresh with the dust of the graver when the artist first attempted to palm it off as a genuine relic of the Mound-builders.* "The Round Tower of Newport," instead of being a Norse monument, turns out to be but a wind-mill built by one of the Rhode-Island governors; and "The Skeleton in Armor" which the poet has wrought into a fine ballad, represented simply all that was mortal of a Narragansett Indian rigged out in European trappings.

The Rev. Morgan Jones, who swore that in his travels among the "Doegs" of the Tuscarora Nation, he found a people with whom he could converse familiarly in the Welsh language, may have been a very worthy man; but we are disposed to question the truthfulness of a statement at this day, when the author deems it necessary to fortify it by a self-sought oath. †

* Whittlesey, "Archæological Frauds," 1872.

† See "Gentleman's Magazine," 1740.

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